

SMD WATCH CRYSTAL 32.768 kHz

SERIES „M2012 STANDARD“ (2 pad ceramic housing 2.0 x 1.2 mm)

FEATURES

- + Small ceramic packaged 32.768 kHz quartz crystal
- + High reliability for low cost / ultra low profile
- + Standard operating temperature range of -40/+85°C, others available on request
- + Excellent clock generator for CPU's, Wireless, Mobile Comm., RTC, IoT, Industrial, etc.
- + LRT-TECHNOLOGY Inside (LRT is our unique Low ESR Resonator-Technology)
- + Our top quality promise / depth of production:
 - Only use of crystal blanks from our in-house production, based on our unique LRT-Technology
 - Excellent product features guaranteed by multiple 100% tests and 100% end-test
 - 100% quality monitoring from crystal raw material to the end product
 - Excellent quality, performance and reliability is guaranteed.



GENERAL DATA

PARAMETERS	PRODUCT FEATURES AND CONDITIONS
SMD-CRYSTAL SERIES	M2012
NUMBER OF SOLDER PADS	2
FREQUENCY RANGE	32.768 kHz
FREQUENCY TOLERANCES AT 25°C	±20 ppm (standard) / ±10 ppm (option)
LOAD CAPACITANCE (C _L)	12.5 pF (standard) 4, 6, 7, 9 pF or 18 pF available on request
WORKING TEMPERATURE RANGE	-40/+85°C
RESONANCE RESISTANCE	60 kΩ typ. / 70 kΩ max.
SHUNT CAPACITANCE (C ₀)	1.15 pF typ.
TURNOVER TEMPERATURE	+25°C ±5°C
PARABOLIC COEFFICIENT	-0.036±0.005ppm/°C ²
DRIVE LEVEL	0.1 μW typical (0.5 μW max.)
AGING	±3 ppm max. first year
INSULATION RESISTANCE	>500 MΩ DC/100V ±10%
STORAGE TEMPERATURE	-55°/+125°C
DELIVERY FORM	Tape and Reel (3.000 pcs per reel)
RoHS	Lead free and RoHS compliant
POP (EU)2019/1021	No POP substances
PFAS	No PFAS present
PROP 65	Compliant to PROP 65
TSCA	Compliant to TSCA

[SELECT YOUR REQUIRED CRYSTAL \(PRODUCT CONFIGURATOR\)](#)

[REQUEST CRYSTAL SAMPLES \(SAMPLE CONFIGURATOR\)](#)

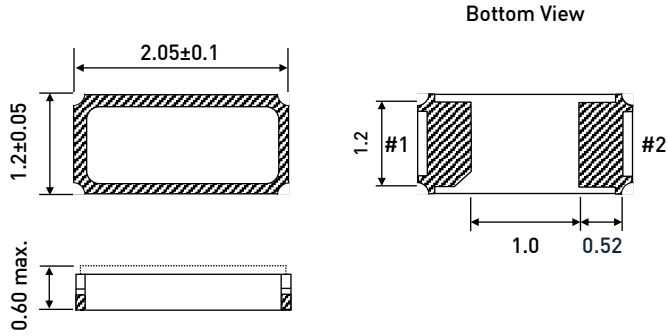
Notes

1. LRT is optimized low ESR resonator design for fast and oscillation start up.
2. The reference temperature for all specified values and tests is +25°C.
3. No Ultrasonic Handling: Do not subject the M2012 to an ultrasonic cleaning environment or to ultrasonic welding process.
Permanent damage or long term reliability issues to the structure may occur.
4. Do not design any ground line under the M2012. / Do not solder with hot air gun.

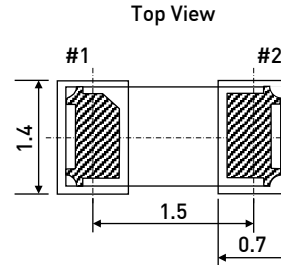
DIMENSIONS AND PATTERNS

PACKAGE SIZE – DIMENSIONS (UNIT:MM)

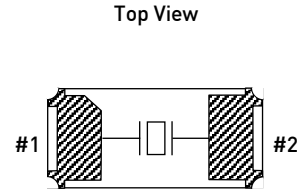
2.0 X 1.2 X 0.6 MM



RECOMMENDED

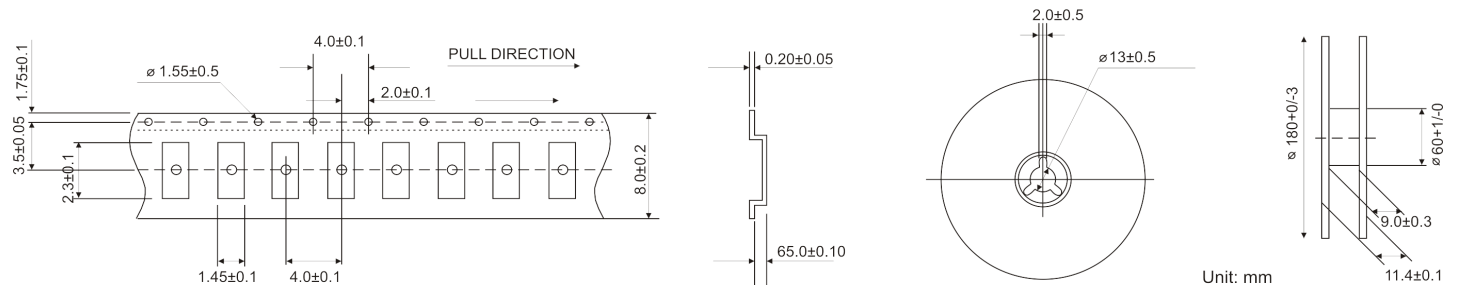


INTERNAL

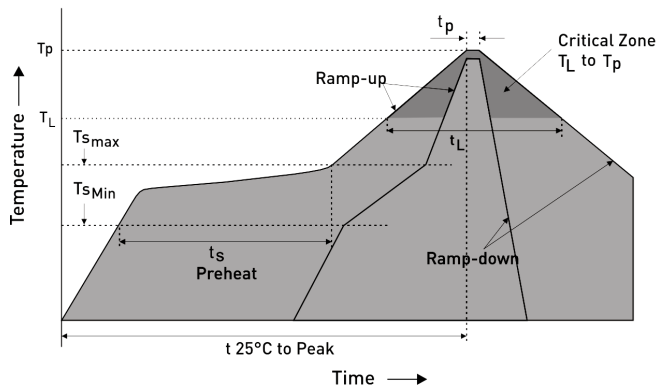


All dimensions in mm typical

REEL SPECIFICATION

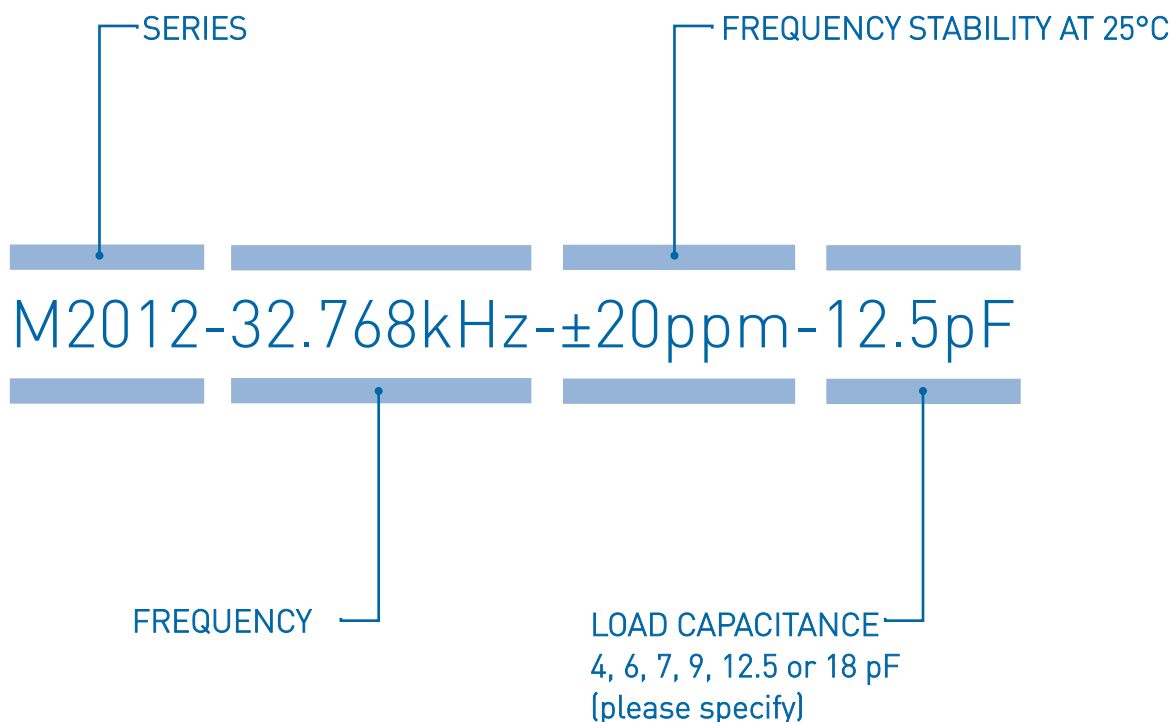


REFLOW SOLDER PROFILE



IPC/JEDEC Standard	IPC/JEDEC J-STD-020
Moisture Sensitivity Level	Level 1
TS MAX to TL (Ramp-up Rate)	3°C/second Maximum
Preheat	
- Temperature Minimum (TS MIN)	150°C
- Temperature Typical (TS TYP)	175°C
- Temperature Maximum (TS MAX)	200°C
- Time (tS)	60 - 180 seconds
Ramp-up Rate (TL to TP)	3°C/second Maximum
Time Maintained Above:	
- Temperature (TL)	217°C
- Time (TL)	60 - 150 seconds
Peak Temperature (TP)	265°C Maximum
Target Peak Temperature (TP Target)	255°C
Time within 5°C of actual peak (tP)	20 - 40 seconds
Max. Number of Reflow Cycles	2
Ramp-down Rate	6°C/second Maximum
Time 25°C to Peak Temperature (t)	8 minutes Maximum

ORDERING INFORMATION



EXAMPLE: M2012-32.768kHz-±20ppm-12.5pF

PLEASE INDICATE YOUR REQUIRED PARAMETERS

REVISION HISTORY^[1]

REVISION	RELEASE DATE	AMENDMENTS SUMMARY
01	June 2017	<ul style="list-style-type: none"> + Revised load capacitance + Revised resonance resistance + Revised shunt capacitance + Revised drive level + Revised reflow soldering profile + Revised tape and reel options
+ 02	January 2018	<ul style="list-style-type: none"> + Added typical resonance resistance + Added extra load capacitance values: 4,6 pF + Revised dimensions
+ 03	November 2025	<ul style="list-style-type: none"> + Revised load capacitance + Revised shunt capacitance + Revised parabolic coefficient + Revised aging + Revised storage temperature + Added, POP (EU) 2019/1021, PFAS, PROP 65, TSCA

Note:

1. Based on Datasheet version from June 2017/SPEC 01/REV.01
2. Based on Datasheet version from January 2018/SPEC 01/REV.02



PREMIUM QUALITY BY PETERMANN-TECHNIK



OUR COMPANY IS CERTIFIED ACCORDING TO ISO 9001:2015 AND 14001:2015

THIS IS FOR YOU TO ENSURE THAT THE PRINCIPLES OF QUALITY MANAGEMENT ARE FULLY IMPLEMENTED IN OUR QM-SYSTEM AND QUALITY CONTROL METHODS .

CLOCKING YOUR WORLD

RELIABLE · COST-EFFECTIVE · COMPETENT

DESIGN SMARTER – WE MAKE GREAT IDEAS REALITY

FOR ALMOST 30 YEARS, WE HAVE BEEN YOUR SPECIALIST FOR CRYSTALS AND OSCILLATORS – FROM PROVEN STANDARDS TO CUSTOM-TAILORED SOLUTIONS.

YOU DEVELOP WITH THE HIGHEST STANDARDS – WE DELIVER THE COMPONENTS TO MATCH: INNOVATIVE, RELIABLE, AND COST-EFFICIENT.

CHOOSE OUR PRODUCTS AND BENEFIT FROM TOP-TIER QUALITY, INNOVATION, STABLE AND INDEPENDENT SUPPLY CHAINS AND PARTNERSHIP ON HIGHEST LEVEL.

SUSTAINABLE SUCCESS FOR YOU AND YOUR PRODUCTS!