

ATS/ATS-SM SERIES



QUARTZ CRYSTAL

FEATURES

- Standard HC-49/US (thru hole) and HC-49/US-SM (surface mount) Packages
- Stable Frequency Over Temperature and Drive Level
- Fundamental and 3rd Overtone Crystals
- Frequency Range 3.2 64 MHz
- Frequency Tolerance, ±30 ppm Standard
- Frequency Stability, ±50 ppm Standard
- Operating Temperature, -20°C to +70°C Standard, -40°C to +85°C Available
- Tape & Reel Packaging Available
- RoHS/Green Compliant (6/6)



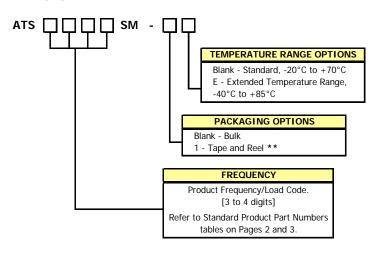
APPLICATIONS

The ATS/ATS-SM crystal series offers excellent long-term stability and reliability in a proven resistance-weld metal package. The excellent shock performance makes it suitable for microprocessor, telecommunication, industrial, consumer electronics and networking applications.

ORDERING INFORMATION

ATS ATS PRODUCT OPTIONS INS - Insulation Spacer TEMPERATURE RANGE OPTIONS Blank - Standard, -20°C to +70°C E - Extended Temperature Range, -40°C to +85°C PACKAGING OPTIONS Blank - Bulk 1 - Radial Taping (Ammopak) * FREQUENCY Product Frequency/Load Code. [3 to 4 digits] Refer to Standard Product Part Numbers tables on Pages 2 and 3.

ATS-SM



** Standard packaging is tape and reel. CTS Distributors may use -T for tape and reel indicator.

Non-Standard Ordering Options

* Standard packaging is bulk in a bag.

- Custom requirements may be available upon request. Use form C052 to detail non-standard parameters. (http://www.ctscorp.com/components/CTS_Crystal_Specifying_Form.xls)
- Contact your local CTS Representative or CTS Customer Service for assistance.



ATS/ATS-SM SERIES LOW COST QUARTZ CRYSTAL

STANDARD PRODUCT PART NUMBERS - ATS

Part numbers in **BOLD** are common stock items through CTS authorized distributors. Non-bold part numbers may be stocked or are available for order.

Contact your CTS Distributor or local CTS Representative for availability.

	PART	PART	Contact your CTS D	istributor or loca	i CT3 Represent	PART	PART		
FREQUENCY			LOAD	OPERATING	FREQUENCY	NUMBER		LOAD	OPERATING
(MHz)	NUMBER	NUMBER	CAPACITANCE	MODE	(MHz)	-20/70°C	NUMBER	CAPACITANCE	MODE
2.570545	-20/70°C	-40/85°C	Carles	Francisco e estad	12.252000		-40/85°C	Carlas	Europia no antal
	ATS036B	ATS036B-E	Series	Fundamental		ATS126	ATS126-E	Series	Fundamental
3.579545	ATSO36	ATS036-E	18 pF	Fundamental		ATS127	ATS127-E	20 pF	Fundamental
3.686400	ATS037A	ATS037A-E	Series	Fundamental	13.500000	ATS135	ATS135-E	20 pF	Fundamental
3.686400	ATSO37	ATS037-E	20 pF	Fundamental	14.318180	ATS143	ATS143-E	Series	Fundamental
3.686400	ATSO4A	ATSO4A F	18 pF	Fundamental	14.318180	ATS14A	ATS14A-E	20 pF	Fundamental
4.000000	ATS04A	ATS04A-E	Series	Fundamental	14.318180	ATS143B	ATS143B-E	18 pF	Fundamental
4.000000	ATS040	ATS040-E	20 pF	Fundamental	14.745600	ATS147	ATS147-E	Series	Fundamental
4.000000	ATS040B	ATS040B-E	18 pF	Fundamental	14.745600	ATS147A	ATS147A-E	20 pF	Fundamental
4.096000	ATS042A	ATS042A-E	20 pF	Fundamental	14.745600	ATS147B	ATS147B-E	18 pF	Fundamental
4.096000	ATSO42B	ATS042B-E	18 pF	Fundamental	15.000000	ATS150	ATS150-E	Series	Fundamental
4.194304	ATSO41C	ATS041C-E	12 pF	Fundamental	15.360000	ATS15A	ATS15A-E	20 pF	Fundamental
4.915200	ATS049A	ATS049A-E	Series	Fundamental	16.000000	ATS160	ATS160-E	Series	Fundamental
4.915200	ATSO42	ATS042-E	20 pF	Fundamental	16.000000	ATS16A	ATS16A-E	20 pF	Fundamental
4.915200	ATS049B	ATS049B-E	18 pF	Fundamental	16.000000	ATS16B	ATS16B-E	18 pF	Fundamental
5.000000	ATS050C	ATS050C-E	Series	Fundamental	16.384000	ATS164B	ATS164B-E	18 pF	Fundamental
5.000000	ATS050A	ATS050A-E	20 pF	Fundamental	16.934400	ATS169	ATS169-E	20 pF	Fundamental
5.000000	ATS050B	ATS050B-E	18 pF	Fundamental	18.000000	ATS180A	ATS180A-E	20 pF	Fundamental
5.068800	ATS051	ATS051-E	Series	Fundamental	18.432000	ATS184	ATS184-E	Series	Fundamental
5.068800	ATS050	ATS050-E	20 pF	Fundamental	18.432000	ATS18A	ATS18A-E	20 pF	Fundamental
6.000000	ATS060A	ATS060A-E	Series	Fundamental	18.432000	ATS184B	ATS184B-E	18 pF	Fundamental
6.000000	ATSO60	ATS060-E	20 pF	Fundamental	19.660800	ATS196	ATS196-E	Series	Fundamental
6.000000	ATS060B	ATS060B-E	18 pF	Fundamental	19.660800	ATS19A	ATS19A-E	20 pF	Fundamental
6.000000	ATS060C	ATS060C-E	32 pF	Fundamental	19.660800	ATS196B	ATS196B-E	18 pF	Fundamental
6.144000	ATS061	ATS061-E	20 pF	Fundamental	20.000000	ATS200	ATS200-E	Series	Fundamental
6.144000	ATS061B	ATS061B-E	18 pF	Fundamental	20.000000	ATS20A	ATS20A-E	20 pF	Fundamental
6.144000	ATS061C	ATS061C-E	32 pF	Fundamental	20.000000	ATS200C	ATS200C-E	18 pF	Fundamental
7.372800	ATS073A	ATS073A-E	Series	Fundamental	20.000000	ATS20B	ATS20B-E	50 pF	Fundamental
7.372800	ATS073	ATS073-E	20 pF	Fundamental	20.480000	ATS204	ATS204-E	20 pF	Fundamental
7.372800	ATS073B	ATS073B-E	18 pF	Fundamental	22.118400	ATS22A	ATS22A-E	20 pF	Fundamental
8.000000	ATS080	ATS080-E	Series	Fundamental	22.118400	ATS221B	ATS221B-E	18 pF	Fundamental
8.000000	ATS08A	ATS08A-E	20 pF	Fundamental	24.000000	ATS240	ATS240-E	Series	Fundamental
8.000000	ATS080B	ATS080B-E	18 pF	Fundamental	24.000000	ATS24A	ATS24A-E	20 pF	Fundamental
8.000000	ATS080C	ATS080C-E	32 pF	Fundamental	24.000000	ATS240B	ATS240B-E	18 pF	Fundamental
8.192000	ATS081B	ATS081B-E	18 pF	Fundamental	24.000000	ATS240C	ATS240C-E	12 pF	Fundamental
9.830400	ATS099	ATS099-E	Series	Fundamental	24.576000	ATS245	ATS245-E	Series	Fundamental
9.830400	ATS098	ATS098-E	20 pF	Fundamental	24.576000	ATS24B	ATS24B-E	20 pF	Fundamental
9.830400	ATS098B	ATS098B-E	18 pF	Fundamental	24.576000	ATS245A	ATS245A-E	18 pF	Fundamental
10.000000	ATS100	ATS100-E	Series	Fundamental	25.000000	ATS250	ATS250-E	Series	Fundamental
10.000000	ATS10A	ATS10A-E	20 pF	Fundamental	25.000000	ATS25A	ATS25A-E	20 pF	Fundamental
10.000000	ATS100B	ATS100B-E	18 pF	Fundamental	25.000000	ATS250B	ATS250B-E	18 pF	Fundamental
	ATS111A	ATS111A-E	Series	Fundamental			ATS270A-E	20 pF	Fundamental
	ATS111	ATS111-E	20 pF	Fundamental		ATS270B	ATS270B-E	18 pF	Fundamental
11.059200	ATS111B	ATS111B-E	18 pF	Fundamental	32.000000	ATS320	ATS320-E	Series	3rd Overtone
11.059200	ATS111C	ATS111C-E	32 pF	Fundamental	32.000000	ATS32A	ATS32A-E	20 pF	3rd Overtone
12.000000	ATS120	ATS120-E	Series	Fundamental	32.000000	ATS320B	ATS320B-E	18 pF	3rd Overtone
12.000000	ATS12A	ATS12A-E	20 pF	Fundamental	40.000000	ATS400	ATS400-E	Series	3rd Overtone
12.000000	ATS120B	ATS120B-E	18 pF	Fundamental	40.000000	ATS40A	ATS40A-E	20 pF	3rd Overtone
12.000000	ATS120C	ATS120C-E	32 pF	Fundamental	40.000000	ATS400B	ATS400B-E	18 pF	3rd Overtone
12.288000	ATS125	ATS125-E	Series	Fundamental	48.000000	ATS480A	ATS480A-E	20 pF	3rd Overtone
12.288000	ATS122	ATS122-E	20 pF	Fundamental	48.000000	ATS480B	ATS480B-E	18 pF	3rd Overtone
12.288000	ATS122B	ATS122B-E	18 pF	Fundamental	60.000000	ATS600A	ATS600A-E	20 pF	3rd Overtone
12.296000	ATS124	ATS124-E	Series	Fundamental	60.000000	ATS600B	ATS600B-E	18 pF	3rd Overtone
12.296000	ATS123	ATS123-E	20 pF	Fundamental	64.000000	ATS640A	ATS640A-E	20 pF	3rd Overtone
	ATS123B	ATS123B-E	18 pF	Fundamental		ATS640B	ATS640B-E	18 pF	3rd Overtone
			- P:						



ATS/ATS-SM SERIES LOW COST QUARTZ CRYSTAL

STANDARD PRODUCT PART NUMBERS -ATS-SM

Part numbers in **BOLD** are common stock items through CTS authorized distributors. Non-bold part numbers may be stocked or are available for order.

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FREQUENCY	PART	PART	LOAD	OPERATING	FREQUENCY	PART	PART	LOAD	OPERATING
(MHz)	NUMBER	NUMBER	CAPACITANCE	MODE	(MHz)	NUMBER	NUMBER	CAPACITANCE	MODE
2 570545	-20/70°C	-40/85°C				-20/70°C	-40/85°C	Carrian	
3.579545 3.579545		ATS036BSM-1E ATS036SM-1E	Series 18 pF	Fundamental Fundamental	14.318180 14.318180	ATS143SM-1 ATS14ASM-1	ATS143SM-1E ATS14ASM-1E	Series 20 pF	Fundamental Fundamental
3.686400		ATS0303W-TE	Series	Fundamental	14.318180	ATS14A3N-1	ATS14ASW-1E	18 pF	Fundamental
3.686400	ATS037SM-1	ATS037ASM-1E	20 pF	Fundamental	14.745600	ATS143D3W-1	ATS143B3W-1E	Series	Fundamental
3.686400	ATS0375M-1	ATS037BSM-1E	18 pF	Fundamental	14.745600	ATS1473M-1	ATS147ASM-1E	20 pF	Fundamental
4.000000	ATS04ASM-1	ATS04ASM-1E	Series	Fundamental	14.745600	ATS147ASW-1	ATS147BSM-1E	18 pF	Fundamental
4.000000		ATS04ASM-1E	20 pF	Fundamental	15.000000	ATS150SM-1	ATS150SM-1E	Series	Fundamental
4.000000		ATS0403M-1E	18 pF	Fundamental	15.000000	ATS1505M-1	ATS1505M-1E	18 pF	Fundamental
4.096000		ATS042ASM-1E	20 pF	Fundamental	15.360000	ATS15ASM-1	ATS15ASM-1E	20 pF	Fundamental
4.096000		ATS042BSM-1E	18 pF	Fundamental	16.000000	ATS160SM-1	ATS160SM-1E	Series	Fundamental
4.194304	ATS041CSM-1	ATS041CSM-1E	12 pF	Fundamental	16.000000	ATS16ASM-1	ATS16ASM-1E	20 pF	Fundamental
4.915200	ATS049ASM-1	ATS049ASM-1E	Series	Fundamental	16.000000	ATS16BSM-1	ATS16BSM-1E	18 pF	Fundamental
4.915200	ATS042SM-1	ATS042SM-1E	20 pF	Fundamental	16.384000	ATS164BSM-1	ATS164BSM-1E	18 pF	Fundamental
4.915200		ATS049BSM-1E	18 pF	Fundamental	16.934400	ATS169SM-1	ATS169SM-1E	20 pF	Fundamental
5.000000		ATS050CSM-1E	Series	Fundamental	18.432000	ATS184SM-1	ATS184SM-1E	Series	Fundamental
5.000000		ATS050ASM-1E	20 pF	Fundamental	18.432000	ATS18ASM-1	ATS18ASM-1E	20 pF	Fundamental
5.000000		ATS050BSM-1E	18 pF	Fundamental	18.432000	ATS184BSM-1	ATS184BSM-1E	18 pF	Fundamental
5.068800		ATS051SM-1E	Series	Fundamental	19.660800	ATS196SM-1	ATS196SM-1E	Series	Fundamental
5.068800 6.000000		ATS050SM-1E	20 pF Series	Fundamental Fundamental	19.660800 19.660800	ATS19ASM-1 ATS196BSM-1	ATS19ASM-1E ATS196BSM-1E	20 pF 18 pF	Fundamental Fundamental
6.000000	ATS060SM-1	ATS060ASM-1E ATS060SM-1E	20 pF	Fundamental	20.000000	ATS200SM-1	ATS200SM-1E	Series	Fundamental
6.000000		ATS060BSM-1E	20 pr 18 pF	Fundamental	20.000000	ATS200SW-1	ATS2003W-TE	20 pF	Fundamental
6.000000		ATS060CSM-1E	32 pF	Fundamental	20.000000	ATS200CSM-1	ATS20ASW-1E	18 pF	Fundamental
6.144000		ATS060CSM-1E	20 pF	Fundamental	20.000000	ATS20BSM-1	ATS200CSW-1E	50 pF	Fundamental
6.144000		ATS061BSM1E	18 pF	Fundamental	20.480000	ATS204SM-1	ATS204SM-1E	20 pF	Fundamental
6.144000		ATS061CSM-1E	32 pF	Fundamental	22.118400	ATS22ASM-1	ATS22ASM-1E	20 pF	Fundamental
7.372800	ATS073ASM-1	ATS073ASM-1E	Series	Fundamental	22.118400	ATS221BSM-1	ATS221BSM-1E	18 pF	Fundamental
7.372800	ATS073SM-1	ATS073SM-1E	20 pF	Fundamental	22.579200	ATS225BSM-1	ATS225BSM-1E	18 pF	Fundamental
7.372800	ATS073BSM-1	ATS073BSM-1E	18 pF	Fundamental	24.000000	ATS240SM-1	ATS240SM-1E	Series	Fundamental
8.000000		ATS080SM-1E	Series	Fundamental	24.000000	ATS24ASM-1	ATS24ASM-1E	20 pF	Fundamental
8.000000		ATS08ASM-1E	20 pF	Fundamental	24.000000	ATS240BSM-1	ATS240BSM-1E	18 pF	Fundamental
8.000000		ATS080BSM-1E	18 pF	Fundamental	24.000000	ATS240CSM-1	ATS240CSM-1E	12 pF	Fundamental
8.000000		ATS080CSM-1E	32 pF	Fundamental	24.576000	ATS245SM-1	ATS245SM-1E	Series	Fundamental
8.192000	ATS081BSM-1	ATSO81BSM-1E	18 pF	Fundamental	24.576000	ATS24BSM-1	ATS24BSM-1E	20 pF	Fundamental
9.830400 9.830400		ATS099SM-1E ATS098SM-1E	Series 20 pF	Fundamental	24.576000 25.000000	ATS245ASM-1 ATS250SM-1	ATS245ASM-1E ATS250SM-1E	18 pF Series	Fundamental
9.830400		ATS098BSM-1E	20 pr 18 pF	Fundamental Fundamental	25.000000	ATS250SM-1	ATS250SW-TE ATS25ASM-1E	20 pF	Fundamental Fundamental
10.000000		ATS100SM-1E	Series	Fundamental	25.000000	ATS25ASW-1	ATS250BSM-1E	18 pF	Fundamental
10.000000		ATS100SM-1E	20 pF	Fundamental	26.000000	ATS260ASM-1	ATS260ASM-1E	20 pF	Fundamental
10.000000		ATS100BSM-1E	18 pF	Fundamental		ATS260BSM-1	ATS260BSM-1E	18 pF	Fundamental
		ATS111ASM-1E	Series	Fundamental		ATS270ASM-1	ATS270ASM-1E	20 pF	Fundamental
11.059200		ATS111SM-1E	20 pF	Fundamental		ATS270BSM-1	ATS270BSM-1E	18 pF	Fundamental
11.059200		ATS111BSM-1E	18 pF	Fundamental	30.000000	ATS300ASM-1	ATS300ASM-1E	20 pF	Fundamental
11.059200		ATS111CSM-1E	32 pF	Fundamental	30.000000	ATS300BSM-1	ATS300BSM-1E	18 pF	Fundamental
12.000000		ATS120SM-1E	Series	Fundamental	32.000000	ATS320SM-1	ATS320SM-1E	Series	3rd Overtone
12.000000		ATS12ASM-1E	20 pF	Fundamental	32.000000	ATS32ASM-1	ATS32ASM-1E	20 pF	3rd Overtone
12.000000		ATS120BSM-1E	18 pF	Fundamental	32.000000	ATS320BSM-1	ATS320BSM-1E	18 pF	3rd Overtone
12.000000		ATS120CSM-1E	32 pF	Fundamental	33.000000	ATS330ASM-1	ATS330ASM-1E	20 pF	3rd Overtone
		ATS125SM-1E	Series	Fundamental	33.000000	ATS330BSM-1	ATS330BSM-1E	18 pF	3rd Overtone
12.288000		ATS122SM-1E	20 pF	Fundamental	36.000000	ATS360ASM-1	ATS360ASM-1E	20 pF	3rd Overtone
12.288000 12.296000		ATS122BSM-1E	18 pF Series	Fundamental Fundamental	36.000000 40.000000	ATS360BSM-1	ATS360BSM-1E	18 pF Series	3rd Overtone 3rd Overtone
12.296000	ATS123SM-1 ATS124SM-1	ATS123SM-1E ATS124SM-1E	20 pF	Fundamental	40.000000	ATS400SM-1 ATS40ASM-1	ATS400SM-1E ATS40ASM-1E	20 pF	3rd Overtone 3rd Overtone
		ATS1245W-1E ATS127SM-1E	Series	Fundamental	40.000000	ATS400BSM-1	ATS40ASM-1E	20 pF 18 pF	3rd Overtone 3rd Overtone
12.352000		ATS1275W-1E	20 pF	Fundamental	48.000000	ATS480ASM-1	ATS480ASM-1E	20 pF	3rd Overtone
12.500000		ATS125BSM-1E	18 pF	Fundamental	48.000000	ATS480BSM-1	ATS480BSM-1E	18 pF	3rd Overtone
13.000000		ATS130SM-1E	20 pF	Fundamental	60.000000	ATS600ASM-1	ATS600ASM-1E	20 pF	3rd Overtone
13.500000		ATS135SM-1E	20 pF	Fundamental	60.000000	ATS600BSM-1	ATS600BSM-1E	18 pF	3rd Overtone
13.500000		ATS135BSM-1E	18 pF	Fundamental	64.000000	ATS640ASM-1	ATS640ASM-1E	20 pF	3rd Overtone
14.000000		ATS140BSM-1E	18 pF	Fundamental	64.000000	ATS640BSM-1	ATS640BSM-1E	18 pF	3rd Overtone
			-		-	-	-	-	



ELECTRICAL CHARACTERISTICS

	PARAMETER	VALUE		
	Frequency Range	3.2 MHz to 64.0 MHz		
	Operating Mode	Fundamental or 3rd Overtone		
RS	Crystal Cut	AT-Cut		
凹	Frequency Tolerance @ +25°C	± 30 ppm Standard *		
PARAME	Frequency Stability Tolerance (Operating Temperature Range, Referenced to 25°C Reading)	± 50 ppm Standard *		
	Operating Temperature Range	-20°C to +70°C * -40°C to +85°C Available, See Ordering Information		
AL	Equivalent Series Resistance	See ESR Table		
C	Load Capacitance or Resonance Mode	See Standard Part Numbers tables *		
TR	Shunt Capacitance (C ₀)	7.0 pF Maximum		
EC	Drive Level	100 μW Typical, 1,000 μW Maximum		
딥	Aging @ +25°C	±3 ppm/yr Typical, ±5 ppm/yr Maximum		
	Storage Temperature Range	-40°C to +85°C		
	Reflow Condition, per JEDEC J-STD-020	+260°C Maximum, 10 Seconds Maximum		

^{*} Custom requirements may be available upon request. Use form C052 to detail non-standard parameters.

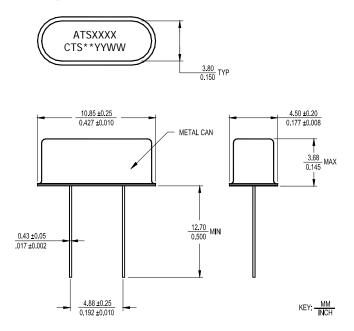
EQUIVALENT SERIES RESISTANCE TABLE

FREQUENCY RANGE	OSCILLATION MODE	ESR MAXIMUM
3.20 MHz - < 4.00 MHz	Fundamental	150 Ohms
4.00 MHz - < 5.00 MHz	Fundamental	120 Ohms
5.00 MHz - < 8.00 MHz	Fundamental	80 Ohms
8.00 MHz - < 12.00 MHz	Fundamental	60 Ohms
12.00 MHz - < 20.00 MHz	Fundamental	40 Ohms
20.00 MHz - < 30.00 MHz	Fundamental	30 Ohms
27.00 MHz - 64.00 MHz	3rd Overtone	80 Ohms

ATS/ATS-SM SERIES LOW COST QUARTZ CRYSTAL

MECHANICAL SPECIFICATIONS

ATS PACKAGE DRAWING



MARKING INFORMATION

- 1. ATSXXXX CTS Part Number.
 - a) The package code "1" is not required in the marking.
 - b) The –E is required in the marking for extended temperature range parts.

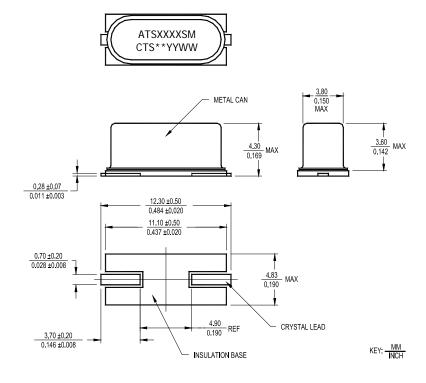
[See Standard Product Part Numbers tables.]

- 2. ** Manufacturing Site Code.
- 3. YYWW Date Code, YY year, WW week.
- Complete CTS part number, frequency value and date code information must appear on bag and box labels.

NOTES

1. Lead finish (e1), SnAgCu.

ATS-SM PACKAGE DRAWING



MARKING INFORMATION

- 1. ATSXXXXXSM CTS Part Number.
 - a) The package code "1" is not required in the marking.
 - b) The –E is required in the marking for extended temperature range parts.

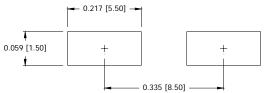
[See Standard Product Part Numbers tables.]

- 2. ** Manufacturing Site Code.
- 3. YYWW Date Code, YY year, WW week.
- Complete CTS part number, frequency value and date code information must appear on bag and box labels.

NOTES

1. Lead finish (e1), SnAgCu.

SUGGESTED SOLDER PAD GEOMETRY

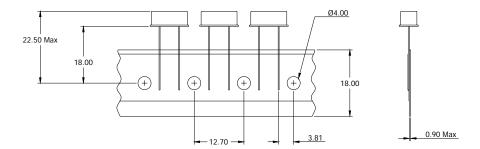




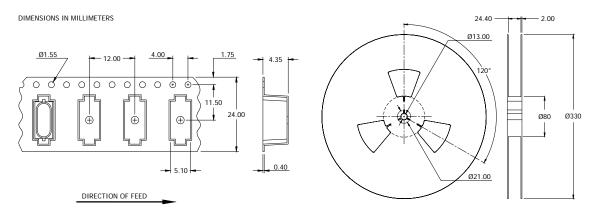
PACKAGING INFORMATION

ATS Radial Taping (Ammopak)

DIMENSIONS IN MILLIMETERS



ATS-SM Tape and Reel



ENVIRONMENTAL SPECIFICATIONS

Temperature Cycle: 400 cycles from -55°C to +125°C, 10 minute dwell at each temperature, 1 minute transfer time

between temperatures.

Mechanical Shock: 1,500g's, 0.5mS duration, ½ sinewave, 3 shocks each direction along 3 mutually perpendicular

planes (18 total shocks).

Sinusoidal Vibration: 0.06 inches double amplitude, 10 to 55 Hz and 20g's, 55 to 2,000 Hz, 3 cycles each in 3 mutually

perpendicular planes (9 times total).

Gross Leak: No leak shall appear while immersed in an FC40 or equivalent liquid at +125°C for 20 seconds.

Fine Leak: Mass spectrometer leak rates less than 2x10⁻⁸ ATM cc/sec air equivalent.

Resistance to Solder Heat: Product must survive 3 reflows of +250°C maximum, 10 seconds maximum.

High Temperature Operating Bias: 2,000 hours at +125°C, disregarding frequency shift.

Frequency Aging: 1,000 hours at +85°C, maximum ±5 ppm shift.

Insulation Resistance: 500M Ohms @ $100V_{DC} \pm 15V_{DC}$. Moisture Sensitivity Level: Level 1 per JEDEC J-STD-020.