

- Automated software based quartz crystal temperature test system
- Measures over 75 different parameters
- Parameter and curve fit characteristics are checked against easy to define QC limits
- Crystals of different frequencies can be tested in a single temperature run
- All data published in a *Microsoft Access*™ data base and can be exported to *Microsoft Excel*™ for custom data analysis
- Crystal part number can be used to set complete measurement parameters, QC limits, temperature test points, and data printouts
- Printouts are generated using *Crystal Reports*®



- Accommodates two dual row test wheels with extended life test head contacts
- Easily loaded S&A proprietary sockets accept HC-45, HC-49, HC-43, HC-49US, HC-18, SMD and tubular type packages
- Typically holds 508 devices per run

SPECIFICATIONS

250B-1 Frequency Range:

15 KHz to 220 MHz

250C Frequency Range:

15 KHz to 500 MHz

Frequency Correlation:

± 1 ppm* at series (typical)

Crystal Power:

1 nW to 1000 uW (1 MHz to 50 MHz)
1 nW to 500 uW (>50 MHz to 200 MHz)

Temperature Stability:

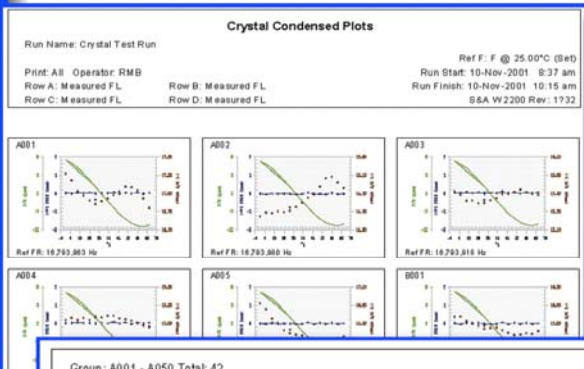
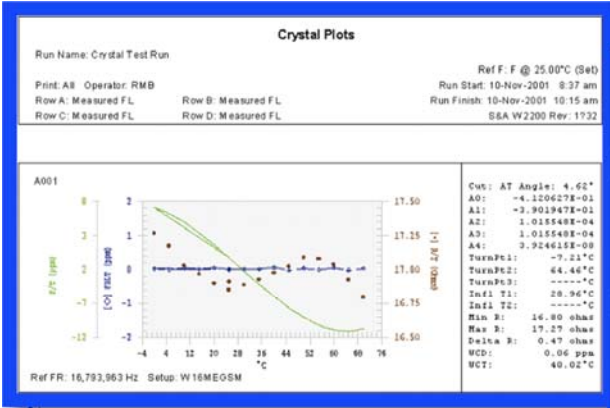
± 0.1° C

* Proprietary measurement and calibration algorithms provide correlation to industry standard crystal measurement equipment.

SYSTEM CONFIGURATION

- S&A 250B-1 or 250C Network Analyzer
- S&A 2451 Switch Controller
- S&A 4220 Temperature Test Chamber (LCO₂, LN₂, or Mechanical Refrigeration Cooling)
- IEC-444 Pi-Network Test Head
- Windows® based System Software
- Printer (Optional)
- Computer Requirements:
 - Minimum 100 MHz Pentium III
 - One full PCI slot with +3.3V & 5V power, Windows 98®

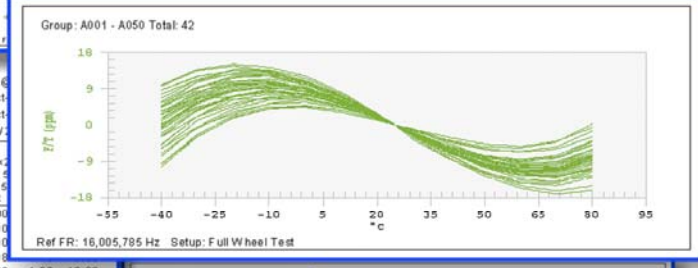
SAMPLE REPORTS



Crystal Tabular

| Run Name: Example Run | Ref F: F @ 25.00°C (Set) |
|--------------------------|---------------------------------|
| Print: All Operator: RMB | Run Start: 26-Oct-2001 4:51 pm |
| Row A: Measured FL | Run Finish: 26-Oct-2001 6:34 pm |
| Row C: Measured FL | S&A W2200 Rev: 1725 |

| A001 <2a001> | A002 <2a002> | A003 <2a003> | A004 <2a004> | A005 <2a005> | | | | | | | | | | |
|----------------------|----------------------|----------------------|----------------------|--------------|-------|-------|--------|-------|-------|--------|-------|-------|--------|-------|
| Setup: 12megw2 | Setup: 12megw2 | Setup: 12megw2 | Setup: 12megw2 | Setup: 5 | | | | | | | | | | |
| Ref F: 12,795,174 Hz | Ref F: 12,795,955 Hz | Ref F: 12,795,917 Hz | Ref F: 12,795,942 Hz | Ref F: 5 | | | | | | | | | | |
| °C | FR ppm | R | °C | FR ppm | R | °C | FR ppm | R | °C | FR ppm | R | °C | FR ppm | R |
| 25.01 | 0.00 | 4.92 | 25.03 | 0.00 | 18.71 | 25.02 | 0.00 | 12.39 | 25.01 | 0.00 | 11.97 | 25.00 | | |
| 0.01 | 0.01 | 5.13 | 0.01 | 8.08 | 21.44 | 0.00 | 3.28 | 12.96 | -0.01 | 3.74 | 12.49 | 0.00 | | |
| 5.02 | 0.33 | 4.98 | 5.00 | 6.79 | 20.77 | 4.98 | 3.16 | 12.82 | 4.99 | 3.52 | 12.38 | 5.00 | | |
| 9.98 | 0.44 | 5.03 | 10.00 | 5.24 | 20.39 | 10.00 | 2.68 | 12.83 | 10.00 | 2.94 | 12.39 | 9.98 | | |
| 15.02 | 0.50 | 5.03 | 15.01 | 3.60 | 10.81 | 15.00 | 3.07 | 13.68 | 14.99 | 3.33 | 13.33 | 14.99 | 1.33 | 18.03 |
| 20.00 | 0.36 | 5.02 | 20.00 | | | | | | | | | | | |
| 25.00 | 0.09 | 5.05 | 25.01 | -0 | | | | | | | | | | |
| 30.02 | -0.12 | 5.04 | 30.01 | -2 | | | | | | | | | | |
| 34.99 | -0.39 | 5.03 | 35.00 | -3 | | | | | | | | | | |
| 40.02 | -0.55 | 5.04 | 40.02 | -5 | | | | | | | | | | |
| 45.03 | -0.52 | 5.06 | 45.02 | -7 | | | | | | | | | | |
| 49.99 | -0.20 | 5.00 | 49.99 | -8 | | | | | | | | | | |
| 54.99 | 0.33 | 4.98 | 55.00 | -9 | | | | | | | | | | |
| 59.99 | 1.33 | 5.05 | 59.99 | -9 | | | | | | | | | | |



Crystal Curvfit Summary

| Run Name: Example Run | Ref F: F @ 25.00°C (Set) |
|--------------------------|---------------------------------|
| Print: All Operator: RMB | Run Start: 26-Oct-2001 4:51 pm |
| Row A: Measured FL | Run Finish: 26-Oct-2001 6:34 pm |
| Row C: Measured FL | S&A W2200 Rev: 1725 |

Crystal Curvfit Tabular

| A002 <2a002> | A003 <2a003> | | | | | | | |
|-------------------|-------------------|-------|-------|-------|-------|-------|-------|-------|
| Setup: 12megw2 | Setup: 12megw2 | | | | | | | |
| Angle: AT(4.47°) | Angle: AT(2.51°) | | | | | | | |
| A0: -5.417392E-01 | A0: -4.797002E-02 | | | | | | | |
| A1: -3.795108E-01 | A1: -2.088013E-01 | | | | | | | |
| A2: 4.165318E-04 | A2: -1.032948E-03 | | | | | | | |
| A3: 8.540013E-05 | A3: 8.513240E-05 | | | | | | | |
| A4: -9.575956E-08 | A4: 2.246727E-07 | | | | | | | |
| TurnP1: -12.98 | TurnP1: -12.98 | | | | | | | |
| TurnP2: 63.94 | TurnP2: 63.94 | | | | | | | |
| TurnP3: --- | TurnP3: --- | | | | | | | |
| Int1 T1: 29.96 | Int1 T1: 29.96 | | | | | | | |
| Int1 T2: --- | Int1 T2: --- | | | | | | | |
| Max R: 12.96 | Max R: 12.96 | | | | | | | |
| Min R: 11.77 | Min R: 11.77 | | | | | | | |
| WCD: -0.16 ppm | WCD: -0.16 ppm | | | | | | | |
| Delta R: 1.18 | Delta R: 1.18 | | | | | | | |
| 25.03 | 0.00 | 0.00 | 0.00 | 17.71 | 25.02 | 0.00 | 0.00 | 12.39 |
| 0.01 | 0.08 | 8.23 | -0.16 | 21.44 | 0.00 | 3.28 | 3.14 | 0.14 |
| 10.00 | 8.24 | 6.45 | -0.22 | 20.39 | 10.00 | 2.69 | 2.64 | 0.14 |
| 15.01 | 3.60 | 3.74 | -0.14 | 19.81 | 15.00 | 2.67 | 1.86 | 0.21 |
| 20.00 | 1.68 | 1.81 | -0.23 | 19.39 | 20.00 | 1.16 | 0.99 | 0.17 |
| 25.01 | -0.23 | 0.01 | -0.24 | 19.12 | 25.01 | 0.17 | 0.00 | 0.17 |
| 30.01 | -2.04 | -1.88 | -0.16 | 18.87 | 30.01 | -0.93 | -1.05 | 0.23 |
| 35.00 | -3.80 | -3.89 | -0.21 | 18.70 | 35.01 | -1.93 | -2.11 | 0.18 |
| 40.02 | -5.61 | -5.38 | -0.23 | 18.62 | 40.01 | -2.94 | -3.09 | 0.15 |
| 45.02 | -7.04 | -6.86 | -0.18 | 18.66 | 45.00 | -3.78 | -3.93 | 0.15 |
| 49.99 | -8.22 | -8.09 | -0.13 | 18.50 | 50.01 | -4.79 | -4.56 | 0.17 |
| 54.99 | 0.33 | 0.27 | 0.08 | 4.98 | 55.00 | -1.15 | -0.91 | -0.14 |
| 59.99 | 1.33 | 1.24 | 0.09 | 5.05 | 59.99 | -0.78 | -0.56 | -0.20 |
| | | | | | 60.01 | -4.71 | -4.45 | 0.14 |
| | | | | | 65.01 | 0.13 | 0.11 | 0.18 |
| | | | | | 70.01 | 0.17 | 0.17 | 0.17 |

Crystal Setup File Parameters

| Run Name: Example Run | Ref F: F @ 25.00°C (Set) |
|--------------------------|---------------------------------|
| Print: All Operator: RMB | Run Start: 26-Oct-2001 4:51 pm |
| Row A: Measured FL | Run Finish: 26-Oct-2001 6:34 pm |
| Row C: Measured FL | S&A W2200 Rev: 1725 |

| Reference F: 12,795,900 Hz | CL: 0.00 pF | Power: 100.00 mW | Into: 12.00 Ohms | Measure: FR/T | | | | | |
|----------------------------|-------------|------------------|------------------|---------------|------|-------|-----|------|-----|
| STATUS | FR | CO | DR | Q | CL | L | PWR | TEMP | F/T |
| | ppm | pF | Ohms | k | FF | mW | mW | °C | ppm |
| | 10.0 | 3.0 | 25.0 | | 13.0 | 13.00 | | | |
| | -10.0 | 2.8 | | | 12.0 | 11.00 | | | |
| Delta | WCD | R/F | CUT | ANG | | | | | |
| Ohms | ppm | Ohms | 25.0 | ° | | | | | |

| A001 <2a001> | Pass | FR | CO | DR | Q | CL | L | PWR | TEMP | F/T |
|--------------|------|-----------|-----|------|------|-------|------|-------|------|-------|
| A001 | Pass | 12.795174 | 3.0 | 25.0 | 13.0 | 13.00 | | | | |
| A002 <2a002> | Pass | 12.795955 | 4.3 | 2.7 | 18.7 | 54 | 12.3 | 12.55 | 134 | 25.03 |
| A003 <2a003> | Pass | 12.795917 | 1.3 | 2.6 | 12.4 | 82 | 12.2 | 12.65 | 122 | 25.02 |
| A004 <2a004> | Pass | 12.795942 | 3.3 | 2.7 | 12.0 | 85 | 12.1 | 12.73 | 121 | 25.01 |

Crystal Failures Only

| Run Name: Example Run | Ref F: F @ 25.00°C (Set) |
|--------------------------|---------------------------------|
| Print: All Operator: RMB | Run Start: 26-Oct-2001 4:51 pm |
| Row A: Measured FL | Run Finish: 26-Oct-2001 6:34 pm |
| Row C: Measured FL | S&A W2200 Rev: 1725 |

| Crystal # | Serial # | Setup File Parameters | Crystal Data | Curvfit Parameter |
|-----------|----------|-----------------------|--------------|-------------------|
| A001 | <2a001> | Full FR Low | | |

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