MAGNETIC HEAD FOR USE WITH
QIC-3080-MC RECORDING FORMAT

(See important notices on the following page)
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1.0 GENERAL SPECIFICATIONS

This specification defines a single-channel, single bump, thin-film head for mini-cartridge tape drives, as defined in QIC Development Standard #QIC-3080-MC.

1.1 Write Head - Thin film inductive, 2 terminal

1.2 Read Head - Thin film magnetoresistive, shielded element

1.3 Transport - Mini-cartridge drive class

1.3.1 Tape Speed (FWD/REV) 34.8, 51.9, and 77.8 ips
1.3.2 Backward Compatible: N/A

1.4 Tape and Cartridge - DC2000 minicartridge with 400' of .250" or .315" width 900 Oe media. Tape tension is 0.5 to 3.5 ounces at rated speeds.

2.0 ENVIRONMENTAL CONDITIONS

2.1 Operation

2.1.1 Temperature +5°C to +45°C
2.1.2 Temperature Gradient 3°C per minute, MAX
2.1.3 Relative Humidity 20% to 80%, noncondensing
2.1.4 Atmospheric Pressure 10.9 to 15.1 psi

2.2 Storage and Transportation

2.2.1 Temperature -40°C to + 60°C
2.2.2 Temperature Gradient 3°C per minute, MAX
2.2.3 Relative Humidity 0% to 90%, noncondensing
2.2.4 Vibration 5 to 63 Hz, 0.1 in. peak-peak displacement; 63 to 500 Hz, 1.5 g's MAX
2.2.5 Shock 20 g's MAX, 11 msec 1/2 sine wave

2.3 Test

2.3.1 Temperature 22°C +5°C
2.3.2 Relative Humidity 40% - 70%
2.3.3 Acclimation Prior to Testing 24 hours (head, tape cartridge and test equipment)
3.0 MECHANICAL SPECIFICATIONS

3.1 Channel Width

3.1.1 Read 0.00200” +0.00004”
3.1.2 Write 0.00390” +0.00008

3.2 Gap-to-Gap Distance 0.000350” MAX

3.3 Read Channel to Write Channel Centerline Mismatch 0.000150” MAX

3.4 Read Gap to Write Gap Parallelism 1 minute MAX

4.0 STATIC TEST SPECIFICATIONS

4.1 DC Resistance

4.1.1 MR Read Element 160 ohms MAX total
4.1.2 Write Coil 10-25 ohms, full coil

4.2 Resonant Frequency

4.2.1 Write (Full Coil) 30 MH z MIN, measured at connector with 33 pF external parallel capacitor

4.3 Inductance

4.3.1 Write Coil (at 2 MHz) 400-600 nH

5.0 DYNAMIC TEST METHOD

5.1 Tape Speed 78 ips

5.2 Read Load 400 ohms ref

5.3 Integrating Read Channel

5.3.1 Bandwidth (3 dB Points) 20 kHz 24 dB/Octave HPF, 3 MHz 6dB/Octave LPF
5.3.2 Schematic See Figure 3 and Note 5

5.4 Tape Cartridge ID per QIC-143

5.5 Read Sensor Current 12 mA nominal, fixed

5.6 Write Equalization Per QIC-3080-MC, See Fig 2
6.0 **DYNAMIC TEST SPECIFICATIONS**

NOTE: Do not expose the head to externally generated fields in excess of 5 Oe. The following tests are to be completed with write equalization, with write current set per item 6.1.

6.1 Find the lowest write current which produces 95% of the maximum 45,000 ftpi output (\text{IREF}).

\[ I_{\text{write}} = 1.15 \times I_{\text{REF}} = 10 - 28 \text{ mA} \]

NOTE: This write current (\text{IW}) shall be used for all subsequent test items.

6.2 Write a write-equalized 11,250 ftpi signal. Read back and compare the amplitude of the positive pulses (\text{PP}) and the negative pulses (\text{NP}) of a write equalized and integrated 11,250 ftpi signal. Compute the amplitude asymmetry per the following equation:

\[ \text{Asymmetry} : \frac{\text{PP} - \text{NP}}{\text{PP} + \text{NP}} \times 100 = \pm 10\% \]

6.3 Measure the 45,000 ftpi output (\text{V1}).

\[ \text{Output} : \quad V1 = 1.0 \text{ to } 3.8 \text{ mV} \]

6.4 Measure the write-equalized and integrated 11,250 ftpi output (\text{V2}).

\[ \text{Resolution} : \quad \frac{V1}{V2} \times 100 = 35-55\% \]

6.5 Record a 45,000 ftpi signal in the forward direction, turn off the write head, and measure output (\text{V1}). Leave read sense current on, and move the tape over the head 10 times (5 FWD, 5 REV). Read the remaining signal in the forward direction (\text{V3}).

\[ \text{Self Erasure} : \quad \frac{V3}{V1} \times 100 = 90\% \text{ MIN} \]

6.6 Measure the amplitude of the fundamental (\text{V1}) and 2nd Harmonic Component of the write-equalized and integrated 11,250 ftpi signal (\text{N1}).

\[ \text{2nd Harmonic} : \quad 20 \log \frac{N1}{V1} = -22 \text{ dB MAX} \]

6.7 Write a write-equalized 11,250 ftpi signal, measure its fundamental amplitude (\text{V1}), then overwrite with a 45,000 ftpi signal. Measure the amplitude of the residual 11,250 ftpi signal (\text{N3}).

\[ \text{Overwrite} : \quad 20 \log \frac{N3}{V1} = -26 \text{ dB MAX} \]
6.8 Measure the output of a 45,000 ftpi signal in the forward direction (F1) and in the reverse direction (R1).

\[
\text{FWD/REV Ratio: } \frac{(F1-R1)}{\text{MAX, F1, R1}} \times 100 = \pm 10\%
\]

6.9 Using an AC-Voltmeter (10 MHz bandwidth), measure the broadband signal level through the test filter circuit when running AC-erased tape over the head (N4). Write a 45,000 ftpi signal, and measure the output (V1).

\[
\text{Signal-to-Noise Ratio: } 20 \log \frac{V1}{N4} = 24 \text{ dB MIN}
\]

NOTE: Signal-to-Noise Ratio measurement to be made without integrator circuit, using a flat read channel response. (See Note 5.)

6.10 Measure the variance in peak-peak envelope of a 45,000 ftpi signal, recording the minimum (VMIN) and maximum (VMAX) envelopes observed.

\[
\text{Modulation: } \frac{(VMAX-VMIN)}{VMAX} \times 100 = 10\% \text{ MAX}
\]
NOTES FOR DYNAMIC TEST SECTION:

1. During testing, the write current waveform shall conform to the following criteria:

   - Write Current Rise Time: 20 nS MAX
   - Write Current Overshoot: 10% MAX

2. All static parameters to be measured at the flex or cable connector.

3. All performance criteria shall be met in both forward and reverse directions.

4. The Read Output shall be calculated by dividing the measured output by the gain of the test preamp and filter circuit. See Figure 3 for definition of the test circuit.

5. All measurements except Signal-to-Noise ratio to be made using integrator circuit detailed in Figure 3. Signal-to-Noise measurement to be made without integrator circuit, with a flat read channel response having 3 dB points at 20 kHz and 3 MHz.
7.0 HEAD CLEANING

CAUTION: The use of any head cleaning system, whether employing wet, dry, or scrubbing actions, must be extremely care-fully tested and evaluated for efficacy and validated not to cause damage to the tape head structure in ways outlined below, but not limited to those areas described in the following section.

7.1 The following solvent(s) may be used to clean the head without:

(a) causing damage to its structure;

(b) permitting head fabrication glues and epoxy products to wick to the head to tape interface;

(c) causing damage to the media in the event that small amounts do not evaporate immediately;

1. Reagent grade anhydrous isopropyl alcohol

7.2 Head cleaning cartridge methods must:

(a) limit the solvent applied to a quantity sufficient to clean the head without leaving or redepositing debris;

(b) not permit solvent to seep into the head surface bond lines and contour airbleed slots; and

(c) not contribute to electrostatic discharge problems which damage the head.
FIGURE 1: MECHANICAL DIMENSIONS
FIGURE 2: WRITE EQUALIZATION PATTERN DEFINITION