



# DEVELOPMENT STANDARD

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QIC-134  
Revision E  
20 Jun 96

MAGNETIC RECORDING HEAD FOR USE IN 4 GB  
QIC-3070-MC MINICARTRIDGE AND 13 GB  
QIC-5010-DC DATA CARTRIDGE DRIVES

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(See important notices on the following page)

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QIC DEVELOPMENT STANDARDS

REVISION HISTORY

QIC-134

Revision Level	Detail	Revision Date
Rev. C	(1) Added backward compatible performance to include full read and write compliance to 5.0 GBC drive level.	9/1/93
	(2) Tape length changed to 1200 feet from 925.	9/1/93
	(3) 10GB storage changed to 13 GB	9/1/93
Rev. D	(1) Write ETW changed from 31.5 µm to 30.5 µm	12/8/93
	(2) Add W/R-R/W configuration	12/8/93
Rev. E	Added paragraph 6.0, page 9 ; Caution statement to head cleaning provision	20 Jun 1996

## 1.0 GENERAL SPECIFICATIONS

### 1.1 Type of Head

This specification defines a multi-bump, multi-channel read-while-writing with optional erase, thin film/magneto-resistive head for 1/4" data cartridge and mini-cartridge drives.

It features two configurations:

- RWR (read write read) which has 3 bumps and 2 outriggers or 3 bumps, 1 outrigger and 1 erase.
- W/R-R/W (write/read - read/write or a read/write - write/read version) which has 2 bumps and 2 outriggers or 2 bumps, 1 outrigger, and 1 erase.

Each bump has 4 channels. Three of the 4 channels are for data and servo tracks per the 13GB and 3GB drive formats (144 data tracks and 24 servo tracks). The fourth channel is for backward write and read compatibility per the following QIC drive formats:

	3GB	13GB
Write & Read		QIC-5.0 GBC QIC-2.1 GBC QIC-1350 QIC-1000/2000 QIC-525
Read Only	QIC-3020-MC QIC-3010-MC QIC-80 QIC-40	QIC-150 QIC-120 QIC-24

1.2 Write Head Structure - Thin-film inductive elements.

1.3 Read Head Structure - Thin-film shielded magneto-resistive elements.

## 2.0 ELECTRICAL SPECIFICATIONS

### 2.1 Tape I/D and Speed Tension Matrix

– 13 GB Data Cartridge Drive

Tape I/D (91-39) = DC 13 GBC (1200' length)

Speed (IPS)	Tension (oz)
45	1.0 - 3.25
90	1.2 - 3.50
120	1.4 - 3.75

– 3 GB Data Cartridge Drive

Tape I/D (91-44) = DC 3 GBC (295' length)

Speed (IPS)	Tension (oz)
25 to 120	0.5 - 3.50

### 2.2 Dynamic Performance, Unequalized - Write Head (Reference square wave recording)

		5 Bump RWR	4 Bump W/R - R/W
2.2.1	Saturation current, $I_{sat}$ (ma) (0 to peak 95% point)	10-35	10-35
2.2.2	Maximum current, $I_{max}$ (ma) $I_{max} = 1.15 \times I_{sat}$	40.25 max.	40.25 max.

2.2.3	Overwrite of 12,700 FCI signal by a 50,800 FCI signal (residual 12,700 FCI/12,700 output at $I_w$ . $I_w$ defined as $1.15 \times 95\% I_{sat}$ )	(dB)	-26 max.	-26 max.
2.2.4	Channel-to-channel spread of $I_{sat}$ (per gap line)	(%)	$\pm 5\%$	$\pm 5\%$

2.3 Dynamic Performance, Unequalized - Read Head  
(Reference square wave recording)

			5 Bump RWR	4 Bump W/R - R/W
2.3.1	Output at 50,800 FCI @ $I_w$	( $\mu v$ )	700 ref.	700 ref.
2.3.2	Sense current	(ma)	10 nom.	10 nom.
2.3.3	Channel-to channel spread per gap line	(%)	$\pm 5$	$\pm 5$
2.3.4	Resolution for 50,800/12,700 @ $I_w$	(%)	$30 \pm 10$	$30 \pm 10$
2.3.5	2nd Harmonic distortion @ $1/4f$	(dB)	-25 max.	-25 max.
2.3.6	Crossfeed (filter set at 3 dB points of 40 KHz & 6.0 MHz). Worst case for this parameter is achieved when channels 1 & 3 are writing and channel 2 is reading. This specification calls for this test.	(dB)	-26 max.	-26 max.

2.3.7	Self erasure (demagnetization at 5th forward pass)	(%)	10 max.	10 max.
2.3.8	Stray field susceptibility. This defines the maximum allowable applied magnetic field while the head is in operation.	(Oe)	5	5

### 3.0 MECHANICAL SPECIFICATIONS

#### 3.1 Dimensions

##### 3.1.1 Gaps (Mechanical) Reference

			5 Bump RWR	4 Bump W/R - R/W
3.1.1.1	Read	( $\mu\text{m}$ ) ( $\mu$ )	$0.50 \pm 0.05$ (20 ref.)	$0.50 \pm 0.05$ (20 ref.)
3.1.1.2	Write	( $\mu\text{m}$ ) ( $\mu$ )	$1.91 \pm 0.10$ (75 ref.)	$1.91 \pm 0.10$ (75 ref.)

##### 3.1.2 Physical Element Width, Reference

3.1.2.1	QIC-13GB/3GB Read (6 places)	( $\mu\text{m}$ ) (mils)	$19.0 \pm 1.0$ (0.75 ref.)	$19.0 \pm 1.0$ (0.75 ref.)
3.1.2.2	Downward Compatible Read (2 places)	( $\mu\text{m}$ ) (mils)	$76.2 \pm 3.8$ (3.00 ref.)	$76.2 \pm 3.8$ (3.00 ref.)
3.1.2.3	QIC-13GB/3GB Write (3 places)	( $\mu\text{m}$ ) (mils)	$30.5 \pm 2.0$ (1.2 ref.)	$30.5 \pm 2.0$ (1.2 ref.)
3.1.2.4	Downward Compatible Write (1 place)	( $\mu\text{m}$ ) (mils)	$177.8 \pm 3.8$ (7.00 ref.)	$177.8 \pm 3.8$ (7.00 ref.)

3.1.3	Gap-to-Gap (2 places)	( $\mu\text{m}$ ) (mils)	$1.524 \pm 0.075$ (60 ref.)	$1.96 \pm 0.1$ (77 ref.)
3.1.4	Read Channel to Write Channel - Centerline Mismatch	( $\mu\text{m}$ ) (mils)	2.54 max. (0.1 max. ref.)	2.54 max. (0.1 max. ref.)
3.1.5	QIC-13GB/3GB Pitch Ch. 1 to Ch. 2.	( $\mu\text{m}$ ) (mils)	$408 \pm 1$ (16.0 ref.)	$408 \pm 1$ (16.0 ref.)
3.1.6	QIC-13GB/3GB Pitch Ch. 2 to Ch. 3	( $\mu\text{m}$ ) (mils)	$816 \pm 1$ (32.0 ref.)	$816 \pm 1$ (32.0 ref.)
3.1.7	QIC-13GB/3GB Pitch Ch. 1 to Ch. 3	( $\mu\text{m}$ ) (mils)	$1224 \pm 1$ (47.8 ref.)	$1224 \pm 1$ (47.8 ref.)
3.1.8	Downward Compatible (Ch. 4) Position, Ref. Ch. 2	( $\mu\text{m}$ ) (mils)	$408 \pm 1$ (16.0 ref.)	$408 \pm 1$ (16.0 ref.)

3.2 Track and Head Reference Outlines - See Figures 1 through 4

4.0 STATIC SPECIFICATIONS

		5 Bump RWR	4 Bump W/R - R/W
4.1	Write D.C. resistance (all tracks)	(ohms)	$10 \pm 5$
4.2	Read D.C. resistance (13GB tracks)	(ohms)	$50 \pm 14$
4.3	Read D.C. resistance (downward)	(ohms)	$84 \pm 14$
4.4	Insulation resistance (read & write, tested at 1.0 V.D.C.)	(Mohms)	10 min.



4.5 Write Impedance  
(reference dimensions only)

13GB coils @ 1.59 MHz	(ohms) (nHys)	9.5 300	9.5 300
13GB coils @ 15.9 MHz	(ohms) (nHys)	9.6 290	9.6 290
Downward coil @ 1.59 MHz	(ohms) (nHys)	10.6 470	10.6 470
Downward coil @ 15.9 MHz	(ohms) (nHys)	10.8 450	10.8 450
4.6 Write resonant frequency (both coils)	(MHz)	70 min.	70 min.

5.0 A.C. ERASE HEAD SPECIFICATION (FOR 13GB OPERATION ONLY)

5.1 Mechanical Requirements

		5 Bump RWR	4 Bump W/R - R/W
5.1.1 Erase track width	(mm) (inches)	7.6 min. 0.300	7.6 min. 0.300 ref.
5.1.2 Erase gap length	( $\mu$ m) ( $\mu$ )	8.64 ref. 340 ref.	8.64 ref. 340 ref.
5.1.3 Erase core material		Manganese zinc ferrite	Manganese zinc ferrite

5.2 Electrical Performance

5.2.1 Erase mode

5.2.2 AC Impedance (ohms)  
(1/2 coil @ 9 MHz)

5.2.3 Coil configuration

5.2.4 Inductance ( $\mu$ Hys)

5.2.5 Current (both legs) (mA)

5.2.6 Operation frequency (MHz)

5.2.7 Erasure (dB)  
Residual 12.7 KFCI  
signal written at 1v  
and 120 ips

AC	AC
46 ref.	46 ref.
Center tapped	Center tapped
1.0	1.0
350 nominal	350 nominal
8.5 ref.	8.5 ref.
-30 max.	-30 max.

6.0 HEAD CLEANING

CAUTION: The use of any head cleaning system, whether employing wet, dry, or scrubbing actions, must be extremely carefully 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.

6.1 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

6.2 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 airbled slots; and
- (c) not contribute to electrostatic discharge problems which damage the head.



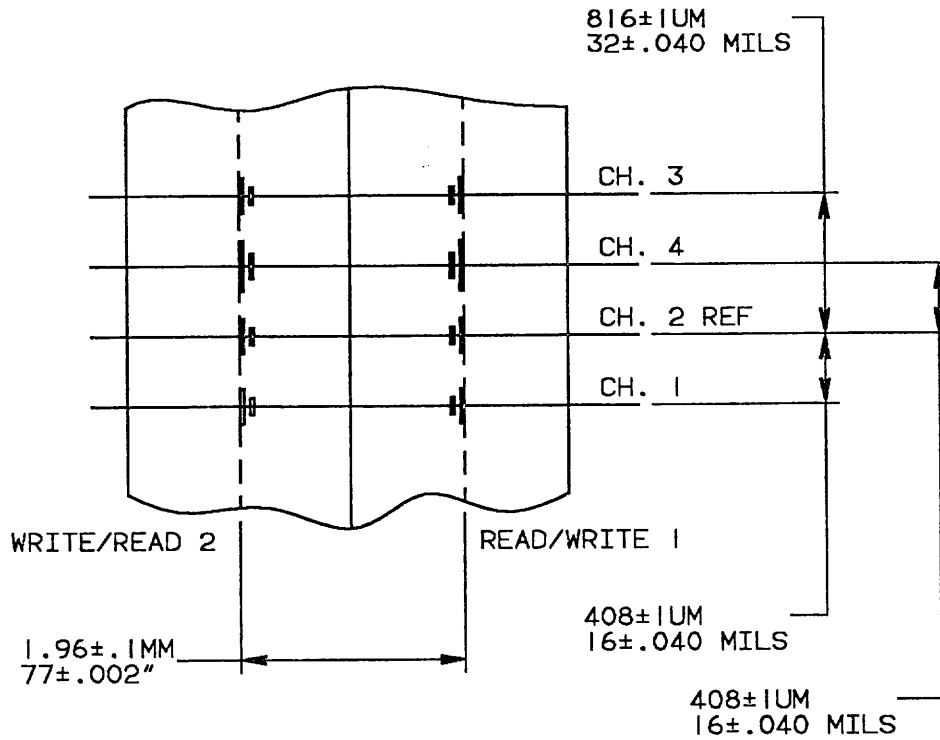
ETW Table

		5 Bump RWR
QIC-13/3 Read	( $\mu\text{m}$ )	$.019 \pm .001$
	(mils)	$.750 \pm .40$
QIC-13/3 Write	( $\mu\text{m}$ )	$.0305 \pm .002$
	(mils)	$1.20 \pm .080$
QIC-Downward Compatible Read	( $\mu\text{m}$ )	$76.2 \pm 3.8$
	(mils)	$3.00 \pm .150$
QIC-Downward Compatible Write	( $\mu\text{m}$ )	$177.8 \pm 3.8$
	(mils)	$7.00 \pm .150$

Track Reference Outlines

Read Write Read

Figure 2



ETW TABLE

		4 BUMP W/R-R/W
QIC-13/3 READ	(MILS)	.019±.001
	(UM)	.750±.040
QIC-13/3 WRITE	(MILS)	.0305±.002
	(UM)	1.200±.080
QIC-DOWNWARD COMPATIBLE READ	(MILS)	76.2±3.8
	(UM)	3.00±.150
QIC-DOWNWARD COMPATIBLE WRITE	(MILS)	177.8±3.8
	(UM)	7.00±.150

Head Reference Outlines  
Write/Read - Read/Write

Figure 3

ETW Table

		4 Bump W/R - R/W
QIC-13/3 Read	( $\mu\text{m}$ )	.019 $\pm$ .001
	(mils)	.750 $\pm$ .40
QIC-13/3 Write	( $\mu\text{m}$ )	.0305 $\pm$ .002
	(mils)	1.200 $\pm$ .080
QIC-Downward Compatible Read	( $\mu\text{m}$ )	76.2 $\pm$ 3.8
	(mils)	3.00 $\pm$ .150
QIC-Downward Compatible Write	( $\mu\text{m}$ )	177.8 $\pm$ 3.8
	(mils)	7.00 $\pm$ .150

Track Reference Outlines

Write/Read - Read/Write

Figure 4