1. PURPOSE

To provide quality assurance during the manufacturing processes of the AuraSound NS3-194-8E full range speaker and to define the "standard" values of the device parameters and tolerance ranges where applicable.

2. SCOPE

Applies to manufacturing processes and reliability requirements of the AuraSound NS3-194-8E 81x81 mm (3 inch) full range speaker.

3. REFERENCE DOCUMENTS

MIL-STD-105E:	Sampling Procedures and Tables for Inspection by Attributes.
C=0:	Zero Acceptance Number Sampling Plans.
EIA-426-B:	Loudspeakers, Optimum Amplifier Power.
GB-9397-88:	Loudspeaker testing standard.
WI-10-38:	Visual inspection procedure.

4. PRODUCT SPECIFICATIONS

Symbols ①②③④ are defined in section 5.

4.1 GENERAL/MECHANICAL SPECIFICATIONS

	Item	Description	Comment	QC
4.1.1	Frame size	81 x 81 mm	Black finish	
4.1.2	Overall depth	51.1 mm		
4.1.3	Mounting holes	4 - Φ 4.5mm holes on Φ 84.4mm diameter		
4.1.4	Magnet structure	Neodymium radial magnet	N194-C08-100A	
4.1.5	Voice coil diameter	19 mm		
4.1.6	Voice coil type	KSV-CCAW		
4.1.7	Polarity	Positive voltage to positive terminal (+) will cause the diaphragm to move away from the magnet structure	GB-9397-88	①②
4.1.8	Total weight	0.21 kg	± 0.0100 kg	

4.2 ELECTRICAL SPECIFICATIONS

	Parameter	Specification	Comment	QC
4.2.1	Nominal power rating	15W RMS, 30 W MAX		
4.2.2	Impedance	8 ohms	± 15% @ 400 Hz, 1 V	①②
4.2.3	Resonant frequency (Fo)	See section 4.3.3 (Fs)		
4.2.4	Sensitivity	85 dB @ 300Hz-3 kHz	± 2 dB @1W,1m	①②
4.2.5	Frequency range	Fo - 20 kHz	-10 dB ref. sensitivity	
4.2.6	Frequency response	125 Hz -20 kHz	± 4 dB ref. to standard	①②
4.2.7	Distortion	-		

4.3. THIELE/SMALL PARAMETERS

Thiele/Small parameters measured by added mass method. **Added mass = 2 grams**. Parameters are calculated based upon a specified effective piston area, Sd. **Use the specified Sd value in line section 4.3.2 for all calculations.**

	Parameter	Specification	Comment	QC
4.3.1	Re (Voice coil DCR)	6.9 ohms	± 10%	②
4.3.2	Sd (Effective piston area)	27.86 cm^2	Specified for T/S calculation	
4.3.3	Fs (Free air resonance)	125 Hz	± 20%	①②
4.3.4	Qms (Mechanical. damping)	7.1	For reference only	
4.3.5	Qes (Electrical Q)	0.6	For reference only	
4.3.6	Qts (total Q)	0.55	For reference only	
4.3.7	Vas (Equivalent acoustic compliance)	1.22 L	For reference only	
4.3.8	Le (Voice coil inductance, @ 1kHz)	-	For reference only	
4.3.9	Xmax (Linear excursion)	-	For reference only	
4.3.10	BL (Flux density x coil wire length)	4.0 T-M	± 10%	②
4.3.11	Mms (Moving mass)	1.75 grams	± 15%	②
4.3.12	Cms (Mechanical compliance)	907 uM/N	For reference only	
4.3.13	ηo (Ref efficiency)	-	For reference only	
4.3.14	Calculated sensitivity	88 dB	For reference only	

4.4 RELIABILITY/SAFETY REQUIREMENTS

	Test	Specification	Comment	Sample Size	QC
4.4.1	Insulation test	>100 megohms between the terminal and frame @ 250 VDC			②
4.4.2	High Excursion Sweep Test	8V from 20 Hz – 500 Hz approx 1 second sweep, minimum of 3 sweeps	The acceptance criteria is to have no vibrations, rubbing or buzzing		①②
4.4.3	Bottoming test	-			
4.4.4	Abbreviated Power/Life test	8WRMS, 2 Hrs @ 8V	Ref. EIA-426-B		③
4.4.5	Power/Life test	8WRMS, 100 Hrs@ 8V	Ref. EIA-426-B (See **note 1**)	6	④
4.4.6	Power Cycle Testing	8WRMS, 96Hrs@ 8V	20 Hz sine wave signal, 1 minute on/1 minute off (See **note 2**)	30	④
4.4.7	Destruct Power test	18WRMS, 100 Hrs @ 12 V	Ref. EIA-426-B (See **note 3**)	6	④
4.4.8	Humidity test	40 ± 3°C, 90 ± 3% RH, 48 Hrs	(See **note 4**)	5	④
4.4.9	Heat test	60 ± 3°C, 40 ± 3% RH, 48 Hrs	(See **note 4**)	5	④
4.4.10	Cold test	-20 ± 3°C, 24 Hrs	(See **note 4**)	5	④
4.4.11	Thermal shock test	-			

4.4.12	UV aging test	-			
4.4.13	Salt spray test	-			
4.4.14	Incline impact test	60 degree incline, 600 mm slide 1 cycle	Reference GB-9397-88 (See **note 5**)	5	④

Note 1: This test is to be done according to EIA-426-B using EIA CD disc track 2 and run 100 hrs. Testing and collection of data as per table 1.

TABLE 1

Test Time	Test(s)	Data collection	Comment
Start	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	
24 hrs	High Excursion Test 4.4.3	Pass/Fail	
48 hrs	High Excursion Test 4.4.3	Pass/Fail	
72 hrs	High Excursion Test 4.4.3	Pass/Fail	
96 hrs	High Excursion Test 4.4.3	Pass/Fail	
100 hrs	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	

Note 2: Test will use a 20Hz sine wave. The drivers will be cycled 1 minute on, 1 minute off and run 96 hours. Testing and collection of data as per table 2.

TABLE 2

Test Time	Test(s)	Data collection	Comment
Start	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	
2 hrs	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	
24 hrs	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	
48 hrs	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	
72 hrs	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	
96 hrs	High Excursion Test 4.4.3	Pass/Fail	
	Performance measurements	Thiele/Small, frequency response, impedance data	

Note 3: This test is to be done according to EIA-426-B using EIA CD disc track 2 and run 100 hrs. Testing and collection of data as per table 1. This test is to test for failure modes. **There is no pass/fail requirement for this test, only data collection**. Data will be used to evaluate continuous improvement opportunities.

Note 4: After testing, and a 4 Hr dormant period, the driver will be subjected to all tests marked with ②. A parameter shift of 5% is allowed.

Note 5: After testing, the driver will be subjected to all tests marked with ②. A parameter shift of 5% is allowed.

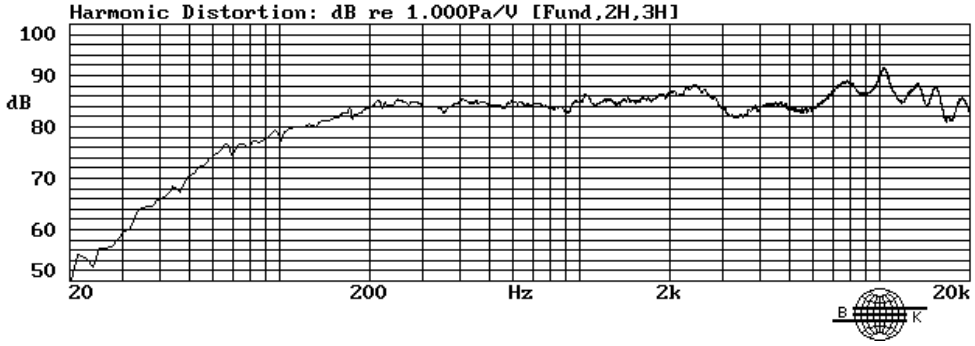
4.5 APPEARANCE REQUIREMENTS

	Test	Specification	Comment	QC
4.5.1	Visual Criteria	WI-10-38		①②

4.6 REFERENCE CURVES

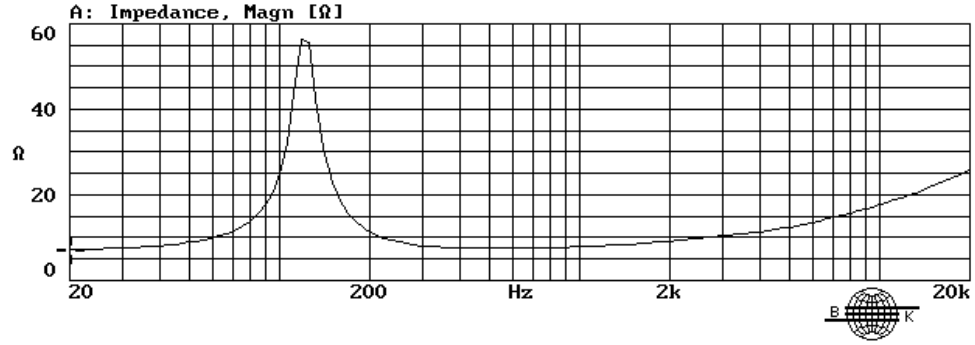
4.6.1 Frequency Response

The following curve is for reference only and is representative of one engineering sample. Input voltage 2.83V (1W), measured at 1m.



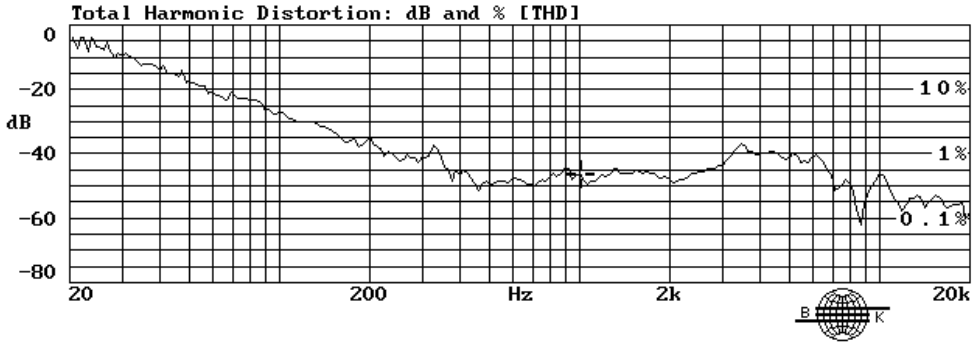
4.6.2 Impedance

The following curve is for reference only and is representative of one engineering sample. Input voltage 1V.



4.6.3 Distortion

The following curve is for reference only and is representative of one engineering sample. Input voltage 2.83V (1W), measured at 1m.



5. TESTING REQUIREMENTS

Specifications in section 4 are marked with testing requirement symbols ①②③④ which specify the required testing level as follows:

5.1 Symbol ①

The ① symbol specifies 100% on-line testing be performed on these specifications. Items which fail to pass the required test or fall outside the specified tolerance limit are to be rejected.

Rejected units may be reworked or repaired as long as final production units meet full acceptance criteria.

5.2 Symbol ②

The ② symbol specifies audit testing be performed on these specifications based on a sampling plan of C=0 (AQL 1.0). No failures allowed unless otherwise defined by the AQL level and sample size.

5.3 Symbol ③

The ③ symbol specifies MIL-STD-105E special inspection level S-2 (AQL 2.5) audit testing be performed on these specifications. No failures allowed unless otherwise defined by the AQL level and sample size.

5.4 Symbol ④

The ④ symbol specifies testing for initial product qualification and manufacturing changes. During the production life of the product, any process, material or design change must be qualified through complete testing prior to the change being implemented. A capability report must be completed and reviewed before production starts. All products must be re-qualified on an annual basis.

5.5 Disposition of samples

Samples tested per sections 4.1, 4.2, 4.3, 4.4.1, 4.4.2 and 4.4.3 may be returned to inventory if each passes all testing requirements.

Samples tested per sections 4.4.4 through 4.4.14 must not be returned to inventory. Samples can be retained for further analysis or can be destroyed after proper documentation has been completed.

6. SPECIFICATION CHANGES

If the capability reports show that there has been a shift in the mean of any of the specifications which would result in more than a 0.5% of production units following outside the tolerance limits, a request to engineering for a new Test Specification must be made.

Until such time as Engineering releases a new Test Specification, production may continue as long as units that do not pass the testing criteria are rejected, or a Deviation can be submitted to Engineering for approval pending the release of a new Test Specification.

7. MECHANICAL DIMENSIONS