



# PRODUCT INFORMATION

**Part Number**    **CEM-DB60223-283AD-PAHCAR-00-0**    **Revision**    **2-2017**

**Type**                    **Omni-Directional Digital Electret Condenser Microphone**

**Description**            This DECM (Digital electret condenser microphone) and ECM consists of a preamplifier, a delta sigma modulator, and an on-chip voltage regulator. The A/D conversion is performed by a 4<sup>th</sup> order  $\Delta\Sigma$  modulator.



**Compliance**            ➤ **RoHS, Lead Free**  
                                   ➤ **ISO                    9001:2000**



## 1. Electrical Characteristics

(Temp=20±2°C Room Humidity=65±5%)

No	Parameter	Symbol	Min	Typ	Max	Unit	Comments
1.1	Sensitivity(analog signals output)	S	-31	-28	-25	dB	0dB=1V/Pa, at 1kHz
1.2	Noise transfer function cut-off	NTF		0.055 x fCLK		MHz	Relative to fCLK
1.3	Modulator order			4			Given by design
1.4	Idle mode tone frequency	fT	22			KHz	@ Fclk=1 MHz
1.5	Clock freq.(sample rate)	fCLK	1	2.4	3	MHz	
1.6	Clock duty cycle	fDC	40	50	60	%	
1.7	Jitter tolerance	δ			0.5	ns	
1.8	Output Voltage low	VIOL	-0.3		0.35 VDD X	V	
1.9	Output Voltage high	VIOH	0.65 VDD X		VDD+0.3	V	
1.10	Output current at high voltage	IH	1		10	mA	Short circuit current
1.11	Extended Vdd range		2.4	3.3	3.63	V	
1.12	Signal to Noise Ratio	S/N	57			dB	at 1kHz S.P.L=1Pa (A-Weighted Curve)

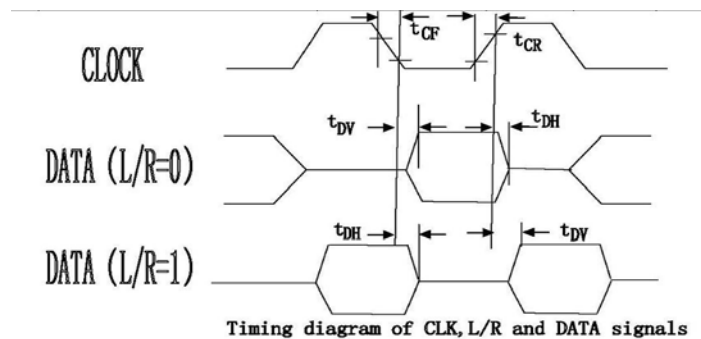
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## 2. Digital Logical Characteristics

Symbol	Parameter	Min	Typical	Max	Units
$V_{IT+}$	Positive-going input threshold voltage		1.82		V
$V_{IT-}$	Negative-going input threshold voltage		1.27		V
$\Delta V_{IT}$	Input hysteresis		0.55		V
$V_{IOL}$	Data input/output logic low level	-0.3		$0.35 \cdot V_{DD}$	V
$V_{IOH}$	Data input/output logic high level	$0.65 \cdot V_{DD}$		$V_{DD} + 0.3$	V

	High Impedance	Data sampled at	L/R_SELECT Connected to
$DATA_L$	Falling clock	Rising clock	GND
$DATA_R$	Rising clock	Falling clock	$V_{DD}$



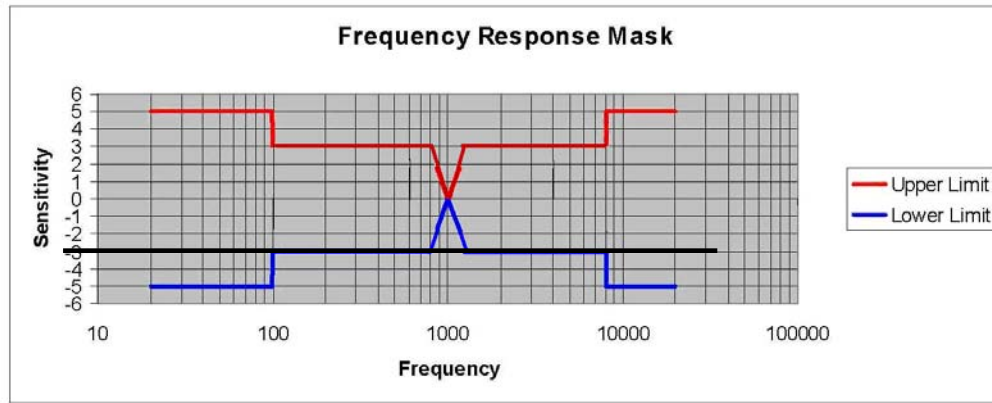
## 3. Frequency Response Curve

The microphone must fulfill the relative frequency response tolerance window specifications with the following measurement conditions.

- **TEMPERATURE:** +20°C
- **ACOUSTIC STIMULUS:** 1Pa (94dB SPL) - measured at 50 cm from the Hi-Fi loudspeaker. The loudspeaker must be equalized for flat frequency response.
- **POSITION:** The far field measurement point is located 50cm from the Hi-Fi speaker. The speaker must be positioned away from any reflecting surfaces. The 1Pa acoustic stimulus is at the microphone position.

### Frequency Response Mask for Digital microphones

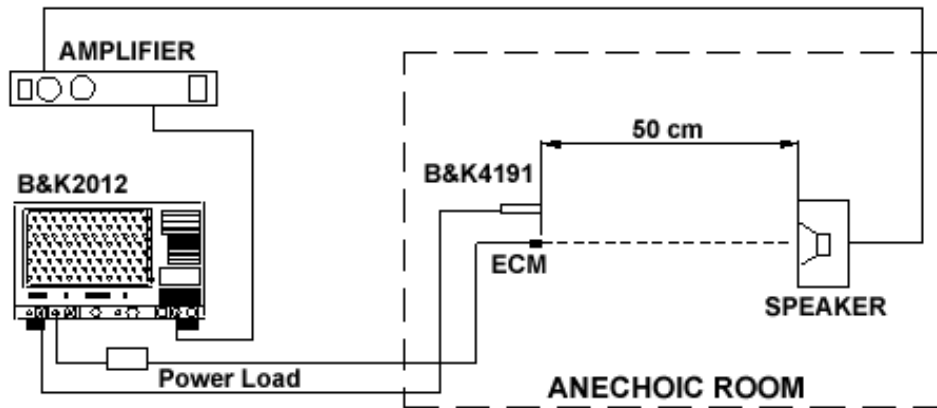
Frequency / Hz	Lower limit	Upper limit	Unit
20 ... 100	-5	+5	dBr 1kHz
100 ... 8000	-3	+3	dBr 1kHz
8000 ... 20 000	-5	+5	dBr 1kHz



**NOTICE:**

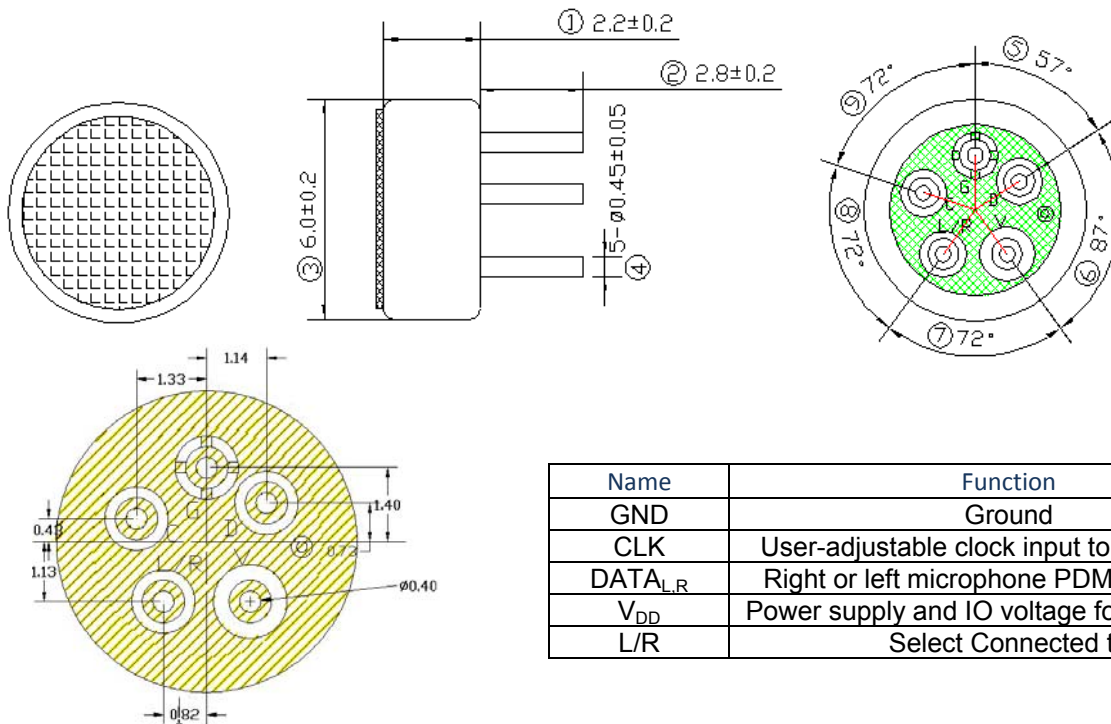
The distribution of the sensitivity must be a Normal Distribution and the Cpk value for the sensitivity must be at least 1.66 in all conditions.

**4. Measurement Circuit**



**5. Appearance And Dimension**

Unit : mm

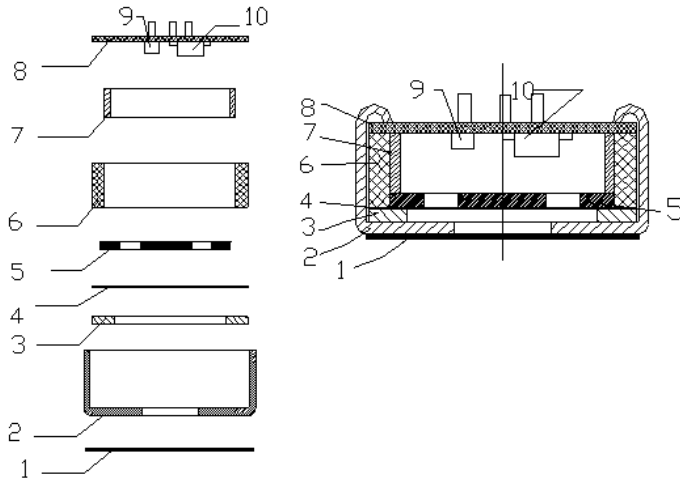


Name	Function
GND	Ground
CLK	User-adjustable clock input to microphone
DATA <sub>L,R</sub>	Right or left microphone PDM data output
V <sub>DD</sub>	Power supply and IO voltage for microphone
L/R	Select Connected to

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## 6. Assembly Drawing



10	IC		1
9	Chip Capacitor	100000PF (0402)	1
8	P.C.B	FR-4	1
7	Copper Ring	Copper Tube	1
6	HOUSING CHAMBER		1
5	ELECTRET BACK		1
4	SPACER		1
3	POLARIZED DIAPHRAGM		1
2	CASE	Al-Mg alloy	1
1	FELT	Fabric cloth	1
<b>No.</b>	<b>Name</b>	<b>Description</b>	<b>QTY</b>

## 7. Temperature Conditions

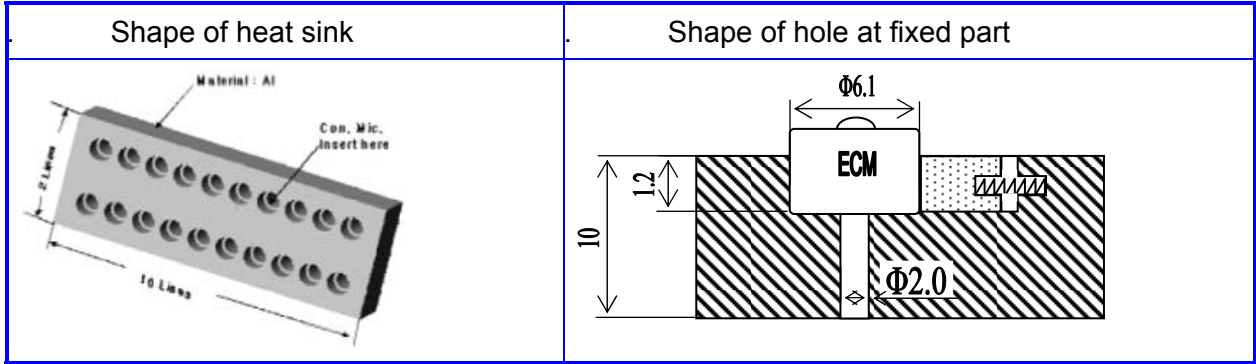
Storage Temperature Range	Operation Temperature Range
-40°C ~ +85°C	-40°C ~ +85°C

## 8. Terminal Mechanical Strength

Terminal mechanical strength to be no interference in operation after pulled the terminal with 1kg strength for 1 minute.

## 9. Soldering Conditions

- We suggest using anti-static welding machine which can control soldering temperature automatically.
- Soldering temperature should be controlled under 320°C and soldering time for each terminal should be 1~2 seconds
- Microphone should be fixed on the metal block (heat sink), which has high radiation effects, and heat sink shall contact with MIC tightly.
- Avoid soldering the pinhole.
- Microphone may easily be destroyed by the static electricity and the countermeasure for eliminating the static electricity shall be executed (worktable and human body shall be ground connection)
- Heat Sink shall be used



## 10. Reliability

After each of following test, the sensitivity of the microphone should be within  $\pm 3\text{dB}$  of initial sensitivity after 3 hours of conditioning at 20°C.

### 10.1. Vibration Test

- Frequency : 10Hz~55Hz
- Amplitude : 1.52mm
- Change of Frequency : 1 octave/min
- 2 hours in each of axes

### 10.2. Dry/Heat

+85°C /-40°C for 72 hours.

### 10.3. Damp Heat

90%~95%RH,+75°C for 72 hours.

### 10.4. Temperature Cycles (10 cycles)

-40	-20~+25	+25	+25~+80	+80	+80~-40
120	60	120	60	120	120

### 10.5 Packing Drop Test

Height : 1m

Procedure: 5 times from each of 3 axis's

### 10.6 Hot Shock

Project	Low temperature	Transition	High temperature	Cycles
Temp °C	-40	Room temperature	+85	10
Time (minutes)	30	≤0.5	30	



## 11. Part Number Description

Code	Description
CE	Challenge Electronics
M	Microphone
-	dash
D	Digital
B	Back Electret
60	6.0 mm diameter
22	2.2 mm height
3	PCB Type
-	dash
PAH	Pin Termination
CAR	Capacitor
-	dash
00	Option
-	dash
0	Option

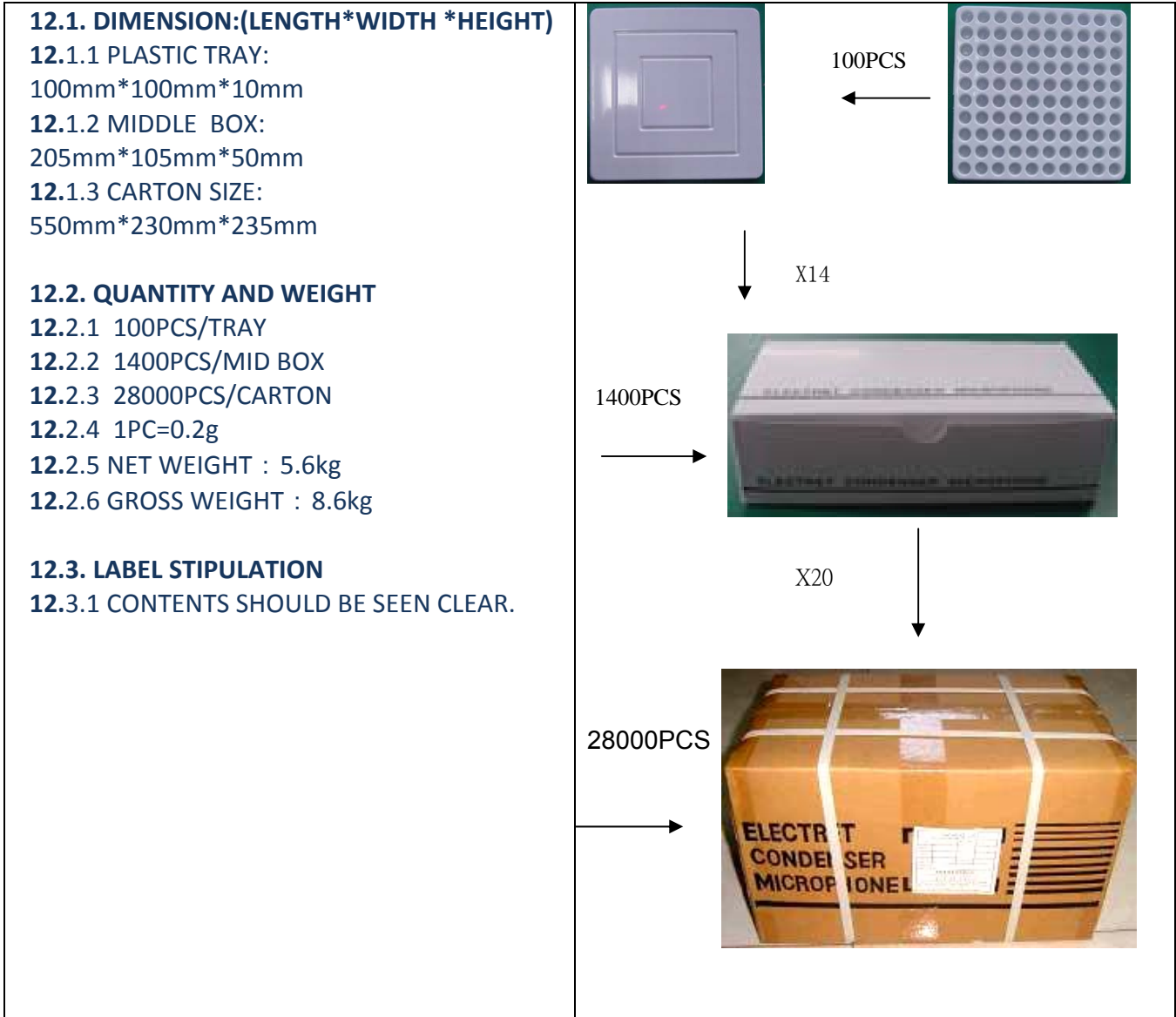
## 12. Warranty

For a period of one (1) year from date of shipping under normal handling and operations conditions

This warranty does not apply to products damaged through misuse, abuse, improper installation, alteration, rework, or attempt to repair



### 13. Packaging



Revision	Description	By	Date
1-2014	Add Product Photo	WS	2014-07-21
2-2017	Add PCB Pin Layout, Removed first page revision table	JL	2017-07-26