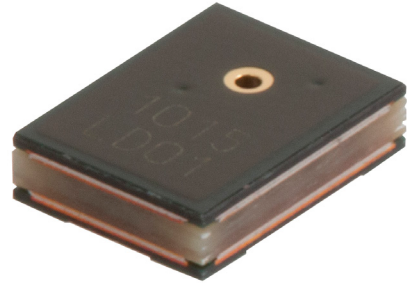


**MODEL:** CMM-4030DT-26165-TR | **DESCRIPTION:** MEMS MICROPHONE**FEATURES**

- digital (PDM)
- top port
- reflow solder compatible
- omnidirectional

**ELECTRICAL**

| parameter                              | conditions/description                                                             | min | typ        | max        | units              |
|----------------------------------------|------------------------------------------------------------------------------------|-----|------------|------------|--------------------|
| directivity                            | omnidirectional                                                                    |     |            |            |                    |
| sensitivity (S)                        | at 1 kHz, 1 V/Pa                                                                   | -27 | -26        | -25        | dB FS              |
| supply voltage (V <sub>DD</sub> )      |                                                                                    | 1.6 | 1.8        | 3.6        | V                  |
| current consumption (I <sub>DD</sub> ) | standby: 1.6~3.6 V input, clock off<br>operating: 1.6~3.6 V input, no load on DATA |     | 650        | 5<br>850   | $\mu$ A<br>$\mu$ A |
| frequency (f)                          |                                                                                    | 100 |            | 10,000     | Hz                 |
| signal to noise ratio (S/N)            | at 1 kHz, 1 V/Pa                                                                   |     | 65         |            | dB A               |
| total harmonic distortion (THD)        | at 100 dB SPL, 1 kHz<br>at 115 dB SPL, 1 kHz                                       |     | 0.2<br>0.5 | 0.5<br>1.0 | %<br>%             |
| acoustic overload point (AOP)          | at 10% THD, 1 kHz, S = typ                                                         |     | 120        |            | dB SPL             |
| power supply rejection (PSR)           | 100 mVp-p square wave @ 217 Hz (A-weighted)                                        |     | -85        |            | dB FS(A)           |

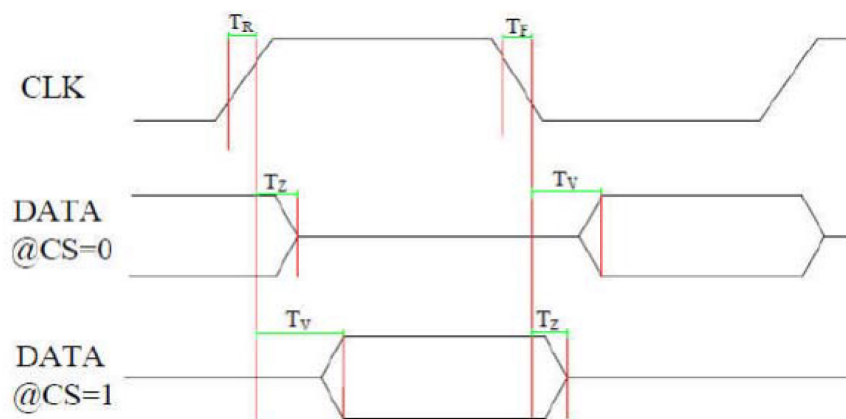
**DIGITAL INTERFACE**

| parameter                                | conditions/description | min                  | typ   | max                  | units    |
|------------------------------------------|------------------------|----------------------|-------|----------------------|----------|
| clock frequency range                    |                        | 1.024                | 2.048 | 3.072                | MHz      |
| data format                              | 1/2 cycle PDM          |                      |       |                      |          |
| short circuit current (I <sub>SC</sub> ) | at 1 kHz, 1 V/Pa       | 1                    |       | 10                   | mA       |
| output load (C <sub>LOAD</sub> )         |                        |                      |       | 100                  | pF       |
| Lid to ground resistance                 |                        |                      |       | 100                  | $\Omega$ |
| logic input high (V <sub>IH</sub> )      |                        | 0.75xV <sub>DD</sub> |       |                      | V        |
| logic input low (V <sub>IL</sub> )       |                        |                      |       | 0.25xV <sub>DD</sub> | V        |
| logic output high (V <sub>OH</sub> )     |                        | V <sub>DD</sub> x0.9 |       |                      | V        |
| logic output low (V <sub>OL</sub> )      |                        |                      |       | V <sub>DD</sub> x0.1 | V        |
| clock duty cycle                         |                        | 40                   | 50    | 60                   | %        |

Notes: 1. All specifications measured at 25°C, humidity at 50±20%, V<sub>DD</sub> = 1.8 V, F<sub>CLOCK</sub> = 2.048 MHz, duty cycle = 50%, no load, input SPL = 94 dB SPL at 1 kHz, unless otherwise noted.

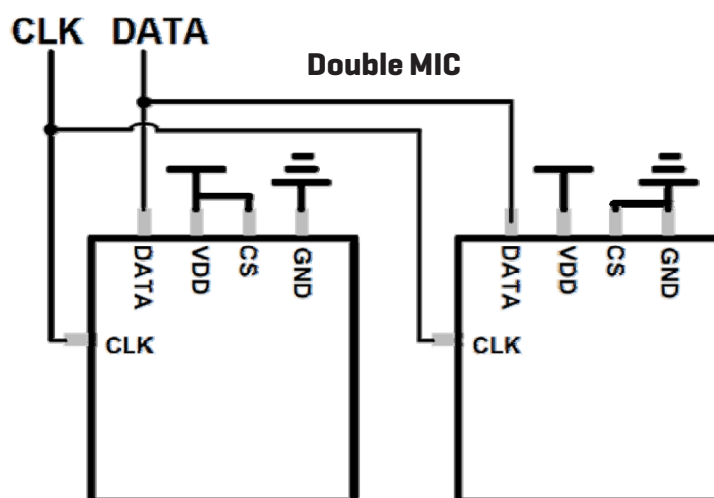
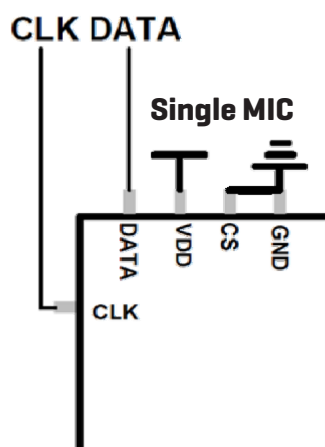
## TIMING CHARACTERISTICS

| parameter                       | conditions/description                      | min | typ | max | units |
|---------------------------------|---------------------------------------------|-----|-----|-----|-------|
| clock rising time ( $T_R$ )     | $R_L=1\text{ M}\Omega$ , $C_L=12\text{ pF}$ |     |     | 10  | ns    |
| clock falling time ( $T_F$ )    | $R_L=1\text{ M}\Omega$ , $C_L=12\text{ pF}$ |     |     | 10  | ns    |
| DATA into high Z time ( $T_Z$ ) | $R_L=1\text{ M}\Omega$ , $C_L=12\text{ pF}$ |     |     | 15  | ns    |
| DATA valid time ( $T_V$ )       | $R_L=1\text{ M}\Omega$ , $C_L=12\text{ pF}$ | 18  |     | 40  | ns    |
| clock jitter                    | period jitter in RMS                        |     |     | 0.5 | ns    |



- Notes:
2. For one-microphone application, the DATA waveform will be @ CS (select)=0
  3. For two-microphone application, system needs to set CS (select)=0 and 1 for two microphones respectively.

## RECOMMENDED INTERFACE CIRCUIT



## OUTPUT PDM DATA

The output format of CMM-4030DT-26165-TR is 1-bit PDM. Oversampling ratio is 64 in typical case. It is comprised of low frequency input signal and high frequency out of band noise. To convert bit PDM into PCM format, a low pass filter is required to remove the out of band noise. This can be done by several 3 parties CODEC or Fortemedia's voice processing chip. If input voltage is in the mid-level, the output will change alternatively between "zero" and "one". If input voltage is higher than mid-level, the output data stream will contain more "ones" than "zeros".

## POWER DOWN MECHANISM

CMM-4030DT-26165-TR will begin to operate when clock applied. It will enter power down mode when clock stops (no matter stops at high or low). Recommended minimum operation dock frequency is 1.024 MHz to avoid any un-wanted malfunction.

Notes: 4. Power supply decoupling capacitors (100 nF, 10  $\mu$ F ceramic) should be placed as near as possible to  $V_{DD}$  of the device.

## ENVIRONMENTAL

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature |                        | -30 |     | 85  | °C    |
| storage temperature   | in packaging           | -40 |     | 100 | °C    |
| RoHS                  | yes                    |     |     |     |       |

## MECHANICAL

| parameter     | conditions/description | min | typ  | max | units |
|---------------|------------------------|-----|------|-----|-------|
| dimensions    | 4.00 x 3.00 x 1.00     |     |      |     | mm    |
| acoustic port | top                    |     |      |     |       |
| terminals     | surface mount          |     |      |     |       |
| weight        |                        |     | 0.03 |     | g     |

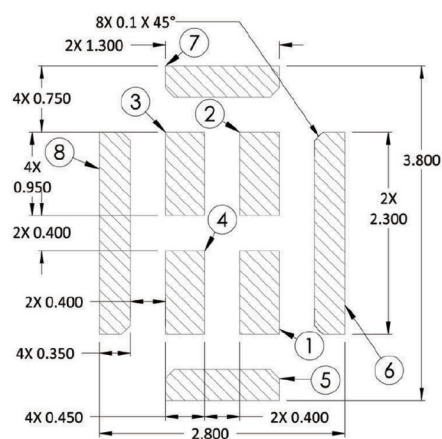
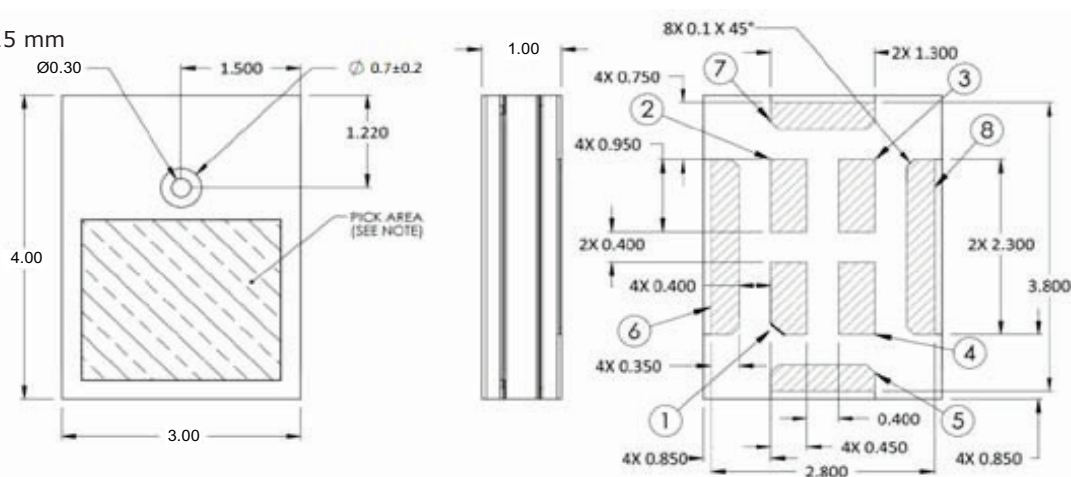
## MECHANICAL DRAWING

units: mm

tolerance:

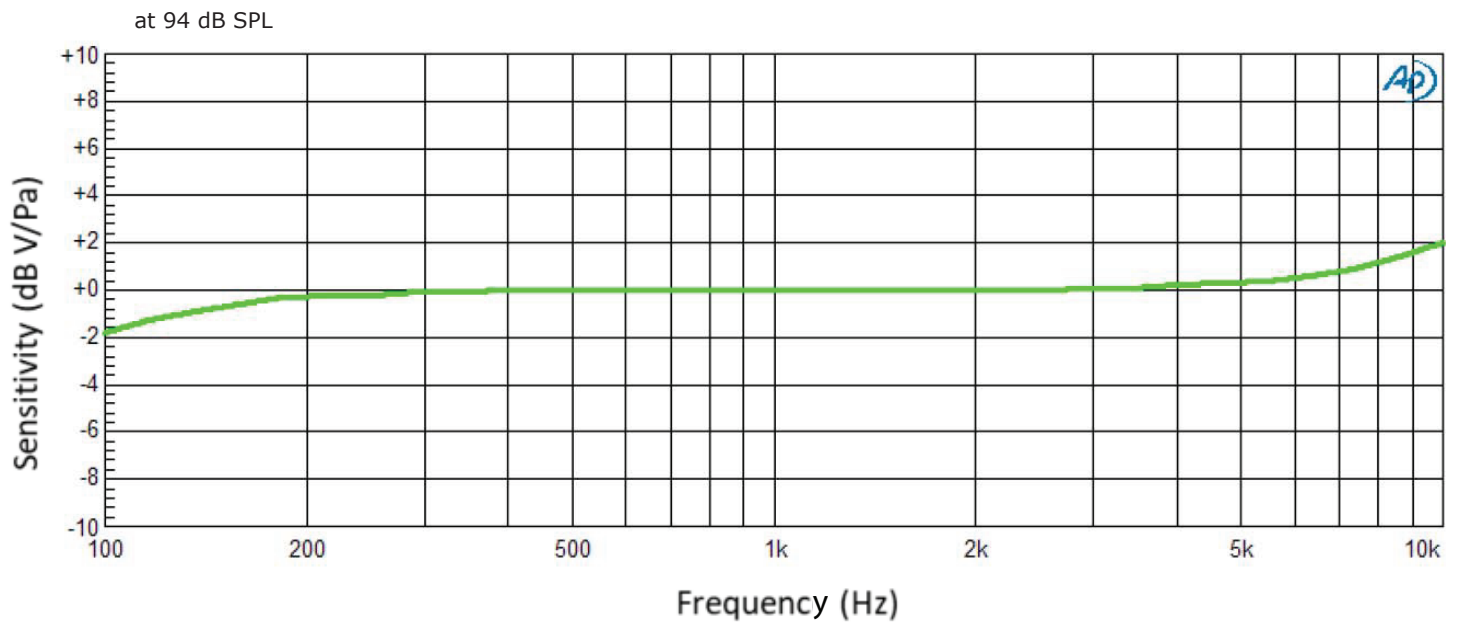
length, width, height:  $\pm 0.10$  mmacoustic port:  $\pm 0.10$  mmunless otherwise specified:  $\pm 0.15$  mm

| TERMINAL CONNECTIONS |          |
|----------------------|----------|
| TERM.                | FUNCTION |
| 1                    | VDD      |
| 2                    | SELECT   |
| 3                    | CLOCK    |
| 4                    | DATA     |
| 5~8                  | GND      |



Recommended PCB Layout  
Top View

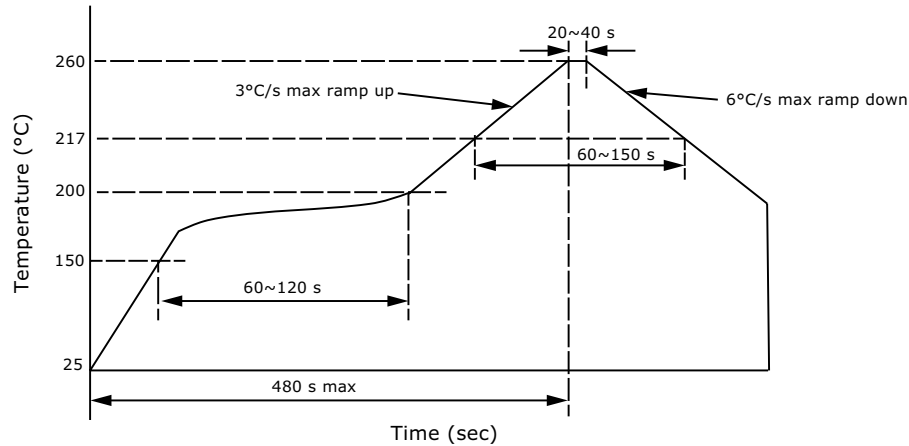
## FREQUENCY RESPONSE CURVE



## SOLDERABILITY

| parameter                     | conditions/description | min | typ | max | units |
|-------------------------------|------------------------|-----|-----|-----|-------|
| reflow soldering <sup>5</sup> | see reflow profile     |     |     | 260 | °C    |

Note: 5. Not recommended to exceed 3 reflow cycles.

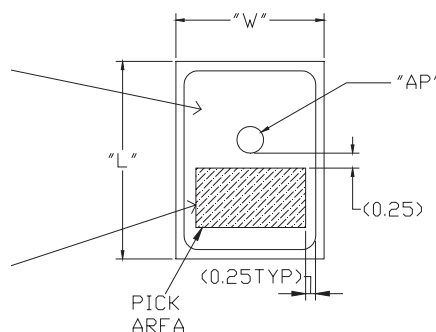


## HANDLING RECOMMENDATIONS

1. Not recommended to blow air heavily over acoustic port as debris could impact mic function.
2. Not suitable for wash process after reflow.
3. Not recommended to brush board with or without solvents after reflow process.
4. Not recommended to directly expose to ultrasonic processing or cleaning.
5. Not recommended to insert any object in port of device at any time.
6. Not recommended to apply over 30 psi of air pressure into the port hole.
7. Not recommended to pull a vacuum over port hole.
8. Not recommended to apply a vacuum when repackaging into sealed bag a rate faster than 0.5 atm/sec.
9. Not recommended to clean table or carried plate with air guarding system that could induce particle floating inside mic.

Vacuum pick-up over the port hole is prohibited

pick up nozzle should stay within acceptable pick-up area

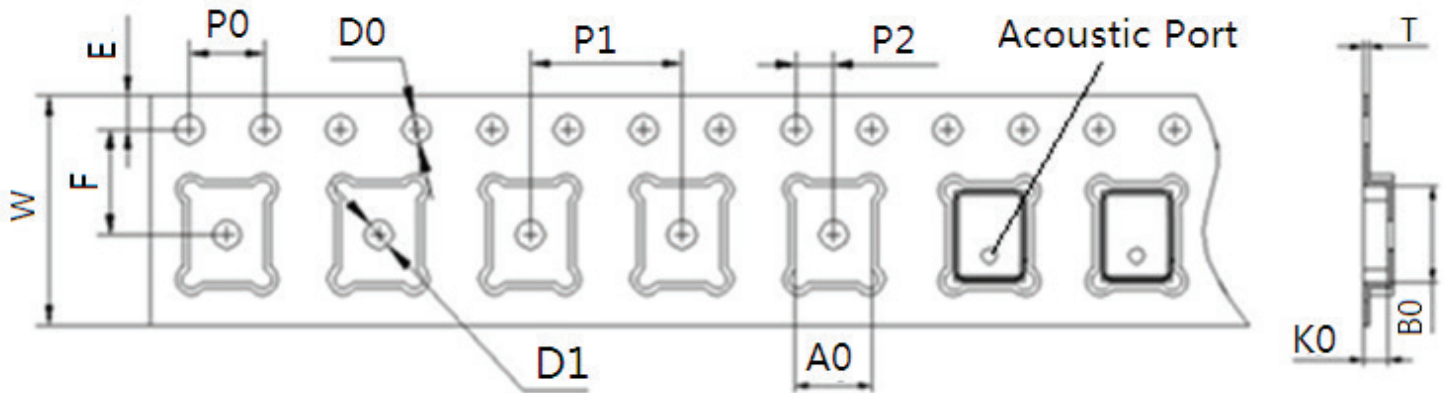


Recommended Vacuum Nozzle Pickup  
Top View

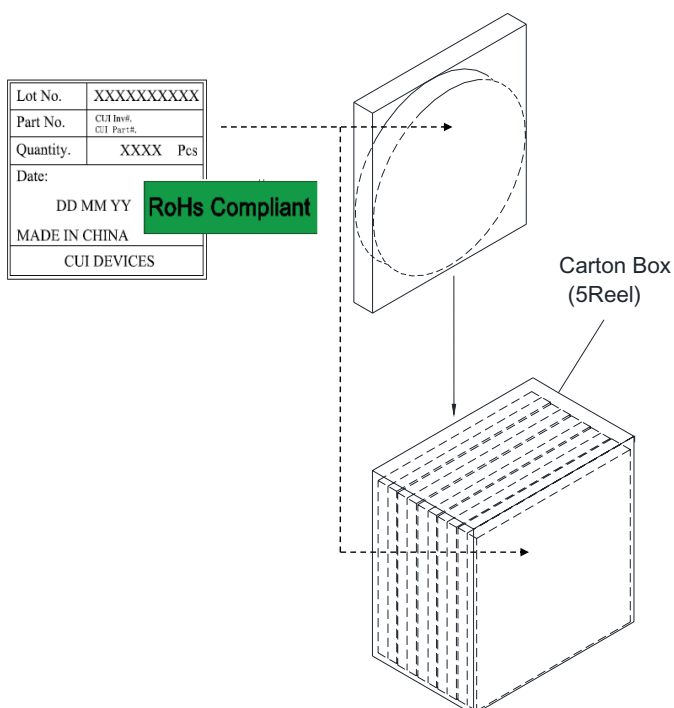
## PACKAGING

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| MSL                   | Class 1                |     |     |     |       |
| reel size             | Ø7 inches              |     |     |     |       |
| reel QTY <sup>6</sup> | 1,100 pcs per reel     |     |     |     |       |
| carton size           | 310 x 210 x 165 mm     |     |     |     |       |
| carton QTY            | 5,500 pcs              |     |     |     |       |

Note: 6. The leader tape of the reel, and the beginning tape fixed into the reel center, will leave 25 blank cavities each.



| Item    | W         | E         | F         | ØD0          | K0        | P0       |
|---------|-----------|-----------|-----------|--------------|-----------|----------|
| DIM(mm) | 12.0±0.30 | 1.75±0.10 | 5.50±0.10 | 1.50+0.10/-0 | 1.20±0.10 | 4.0±0.10 |
| Item    | P1        | A0        | B0        | P2           | T         | D1       |
| DIM(mm) | 8.0±0.10  | 3.30±0.10 | 4.30±0.10 | 2.0±0.10     | 0.30±0.05 | 1.50+0.1 |



## REVISION HISTORY

| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 03/10/2022 |

The revision history provided is for informational purposes only and is believed to be accurate.

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