

# EMI Reduction Spread Spectrum Clock Oscillators

HM \_ C

EMI Reduction Spread Spectrum Clock Oscillators

C group

SMD

CMOS

1.8V

2.5V

3.3V

Min.

16 MHz

Max.

40 MHz

- Reduce electromagnetic interference (EMI) by approx. 3 dB to 12 dB
- Operates with +1.8V to +3.3V supply voltage
- 2.5 x 2.0 , 3.2 x 2.5 , 5.0 x 3.2 , 7.0 x 5.0 mm package size



General specifications of all available packages , at Ta=+25°C , CL=15pF

| Group                                                                  | C Group                                                                                          |                                                                                    |                    |                    |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------|--------------------|
| Type                                                                   | HM22                                                                                             | HM32                                                                               | HM53               | HM572              |
| Dimemsions                                                             | 2.5 * 2.0 * 0.9 mm                                                                               | 3.2 * 2.5 * 1.0 mm                                                                 | 5.0 * 3.2 * 1.2 mm | 7.0 * 5.0 * 1.4 mm |
| Frequency Range                                                        | 16 ~ 40 MHz                                                                                      |                                                                                    |                    |                    |
| Supply Voltage ( V <sub>DD</sub> )                                     | 1.8 V ± 10%                                                                                      | 2.5 V ± 10%                                                                        | 3.3 V ± 10%        |                    |
| Output Logic " High ", "1 "                                            | 1.62 V ( min. )                                                                                  | 2.25 V ( min. )                                                                    | 2.97 V ( min. )    |                    |
| Output Logic " Low ", " 0 "                                            | 0.18 V ( max. )                                                                                  | 0.25 V ( max. )                                                                    | 0.33 V ( max. )    |                    |
| Rise Time / Fall Time<br>[ 10% V <sub>DD</sub> ↔ 90% V <sub>DD</sub> ] | 10 nsec. ( max. )                                                                                | 7 nsec. ( max. )                                                                   | 7 nsec. ( max. )   |                    |
| Current Consumption                                                    | 4 mA ( max. )                                                                                    | 5 mA ( max. )                                                                      | 6 mA ( max. )      |                    |
| Spread Type                                                            | Total%                                                                                           | Down Spread                                                                        | Center Spread      |                    |
| Spread Percentage                                                      | 2.0%                                                                                             | -2.0% ( D2.0 )                                                                     | ± 1.0% ( C1.0 )    |                    |
|                                                                        | 1.5%                                                                                             | -1.5% ( D1.5 )                                                                     | ± 0.75% ( C0.75 )  |                    |
|                                                                        | 1.0%                                                                                             | -1.0% ( D1.0 )                                                                     | ± 0.5% ( C0.5 )    |                    |
| EMI Reduction                                                          | 3 dB to 12 dB ( typ. ) for the main mode                                                         |                                                                                    |                    |                    |
| Modulation Carrier Freq.<br>( Dither rate )                            | 20.9 KHz ( min. ) ; 52.4 KHz ( max. )<br>Frequency dependent . Call for details                  |                                                                                    |                    |                    |
| Duty Cycle                                                             | 50% ± 10%                                                                                        |                                                                                    |                    |                    |
| Output Waveform                                                        | CMOS                                                                                             |                                                                                    |                    |                    |
| Output Load                                                            | 15pF                                                                                             |                                                                                    |                    |                    |
| Start-up Time                                                          | 1.0 msec. ( typ. ) ; 5 msec. ( max. )                                                            |                                                                                    |                    |                    |
| Storage Temperature                                                    | - 55°C to + 125°C                                                                                |                                                                                    |                    |                    |
| Aging at Ta = +25°C                                                    | ± 5 ppm per year ( max. )                                                                        |                                                                                    |                    |                    |
| Output Enable Function                                                 | Enable                                                                                           | When 70% ( min. ) of V <sub>DD</sub> to Enable Output. (Open connection prohibit.) |                    |                    |
|                                                                        | Disable                                                                                          | When 30% ( max. ) of V <sub>DD</sub> to Disable Output.                            |                    |                    |
|                                                                        | Output Enable Time : 5.0 msec. ( max. ) / Output Disable Time: 100 nsec. ( max. )                |                                                                                    |                    |                    |
| Frequency Stability Code<br>( exclude modulation )                     | Freq. Stability over Operating Temperature Range: ± 50 ppm from -40°C to +85°C ( Code is " E " ) |                                                                                    |                    |                    |

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## Part Number Format and Example

| [ 1 ]          | [ 2 ]       | - | [ 3 ]               | [ 4 ]       | - | [ 5 ]            | [ 6 ]      | - | [ 7 ]                  |
|----------------|-------------|---|---------------------|-------------|---|------------------|------------|---|------------------------|
| Supply Voltage | Holder Type |   | Frequency Stability | OE Function |   | Center Frequency | Group Type |   | Spread type Percentage |

|          |     |    |      |   |   |   |   |        |   |   |      |
|----------|-----|----|------|---|---|---|---|--------|---|---|------|
| Examples | (1) | 25 | HM53 | - | F | T | - | 75.000 | B | - | C2.0 |
|          | (2) | 18 | HM32 | - | E | T | - | 25.000 | C | - | D1.0 |

Ex (1) : 25HM53 - FT - 75.000B - C2.0 [ +2.5V, HM-series, HM53 type,  $\pm 100$ ppm from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , OE Function, 75.000MHz, B Group, 2.0% center spread ]

Ex (2) : 18HM32 - ET - 25.000C - D1.0 [ +1.8V, HM-series, HM32 type,  $\pm 50$ ppm from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ , OE Function, 25.000MHz, C Group, 1.0% down spread ]

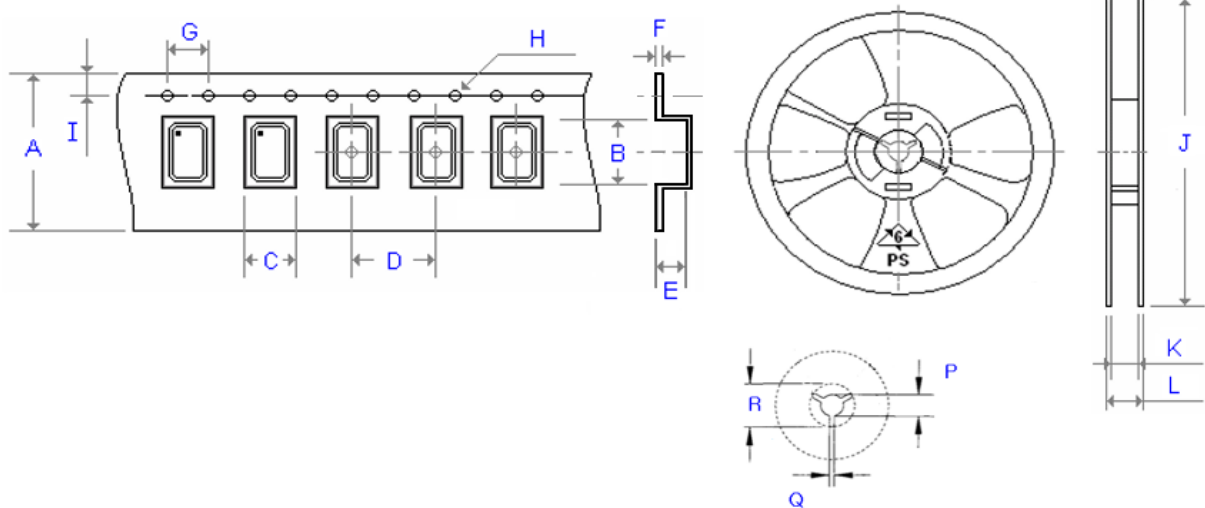
|       |                                                                             |                                                |  |
|-------|-----------------------------------------------------------------------------|------------------------------------------------|--|
| [ 1 ] | Supply voltage code : " 18 " for +1.8V , " 25 " for +2.5V , " 3 " for +3.3V |                                                |  |
| [ 2 ] | Holder Type ( <a href="#">HM53</a> , <a href="#">HM32</a> )                 |                                                |  |
| [ 3 ] | -20°C ~ 70 °C                                                               | " A " ± 25ppm ; " B " ± 50ppm ; " C " ± 100ppm |  |
|       | -40°C ~ 85 °C                                                               | " D " ± 25ppm ; " E " ± 50ppm ; " F " ± 100ppm |  |
| [ 4 ] | " T " for OE Function                                                       |                                                |  |
| [ 5 ] | Frequency in MHz                                                            |                                                |  |
| [ 6 ] | Group " B " , " C "                                                         |                                                |  |
| [ 7 ] | Spread type & percentage ; " C " for center spread , " D " for down spread  |                                                |  |

## Outline Dimensions ( Unit : mm ) , Suggested pad Layout for SMDs

| [ HM22 ] |  | For group : |  | [ HM32 ]  |  | For group : |  |
|----------|--|-------------|--|-----------|--|-------------|--|
|          |  | C           |  |           |  | C           |  |
|          |  |             |  |           |  |             |  |
| [ HM53 ] |  | For group : |  | [ HM572 ] |  | For group : |  |
|          |  | B C         |  |           |  | B C         |  |
|          |  |             |  |           |  |             |  |

# Emboss Taping and Reel Specifications

[ Crystal Oscillator Units ]



Carrier Type Dimensions ( unit : mm ) ±0.3mm

|       | A     | B     | C     | D     | E    | F    | G    | H      | I    | pcs / reel |
|-------|-------|-------|-------|-------|------|------|------|--------|------|------------|
| H21   | 8.00  | 2.30  | 1.90  | 4.00  | 0.90 | 0.25 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_22  | 8.00  | 2.80  | 2.25  | 4.00  | 1.10 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_32  | 8.00  | 3.40  | 2.70  | 4.00  | 1.40 | 0.25 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_53  | 12.00 | 5.30  | 3.60  | 8.00  | 1.40 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| H_57  | 16.00 | 7.30  | 5.30  | 8.00  | 1.90 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| SWO   | 16.00 | 7.20  | 5.40  | 8.00  | 1.80 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| H_216 | 8.00  | 2.30  | 1.90  | 4.00  | 0.90 | 0.25 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_226 | 8.00  | 2.80  | 2.25  | 4.00  | 1.10 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_326 | 8.00  | 3.40  | 2.70  | 4.00  | 1.40 | 0.25 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_536 | 12.00 | 5.30  | 3.60  | 8.00  | 1.40 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| H_576 | 16.00 | 7.30  | 5.30  | 8.00  | 1.90 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| H_328 | 8.00  | 3.40  | 2.70  | 4.00  | 1.40 | 0.25 | 4.00 | Ø 1.50 | 1.75 | 3000       |
| H_538 | 12.00 | 5.40  | 3.60  | 8.00  | 1.70 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| H_578 | 16.00 | 7.30  | 5.30  | 8.00  | 1.90 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 1000       |
| H_43  | 24.00 | 11.80 | 10.00 | 16.00 | 5.00 | 0.30 | 4.00 | Ø 1.50 | 1.75 | 500        |

Reel Dimensions ( unit : mm ) +2.0 / -0.0mm

|       | J      | K     | L     | P     | Q    | R     | pcs / reel |
|-------|--------|-------|-------|-------|------|-------|------------|
| H21   | 180.00 | 9.00  | 12.00 | 13.20 | 2.10 | -     | 3000       |
| H_22  | 180.00 | 9.00  | 12.00 | 13.20 | 2.10 | -     | 3000       |
| H_32  | 180.00 | 9.00  | 12.00 | 13.20 | 2.10 | -     | 3000       |
| H_53  | 180.00 | 13.00 | 16.00 | 13.20 | 2.50 | -     | 1000       |
| H_57  | 180.00 | 17.20 | 19.30 | 13.30 | 2.20 | 22.00 | 1000       |
| SWO   | 180.00 | 17.20 | 19.30 | 13.30 | 2.20 | 22.00 | 1000       |
| H_216 | 178.00 | 8.40  | 11.40 | 13.30 | 2.50 | 20.50 | 3000       |
| H_226 | 180.00 | 8.40  | 11.40 | 13.20 | 2.10 | -     | 3000       |
| H_326 | 180.00 | 9.00  | 12.00 | 13.20 | 2.10 | -     | 3000       |
| H_536 | 180.00 | 13.00 | 16.00 | 13.20 | 2.50 | -     | 1000       |
| H_576 | 180.00 | 17.20 | 19.30 | 13.30 | 2.20 | 22.00 | 1000       |
| H_328 | 180.00 | 8.00  | 12.00 | 13.20 | 2.10 | -     | 3000       |
| H_538 | 180.00 | 13.00 | 16.00 | 13.20 | 2.50 | -     | 1000       |
| H_578 | 180.00 | 17.20 | 19.30 | 13.30 | 2.20 | 22.00 | 1000       |
| H_43  | 330.00 | 24.50 | 29.10 | 13.00 | 2.20 | 17.30 | 500        |