

# HIGH STABILITY RUBIDIUM STANDARDS

SERIAL PRODUCTION AT MORION, INC.

**Features:**

- High reliability;
- Aging up to  $\pm 4.0 \times 10^{-12}$ /day, up to  $\pm 2.0 \times 10^{-10}$ /year;
- Stability vs. temperature up to  $\pm 1.0 \times 10^{-10}$ ;
- Short term stability (Allan deviation) per 1 s up to  $5 \times 10^{-12}$ ;
- Optimal solution for a wide range of telecom and test & measurement applications.



## ORDERING EXAMPLE: FE-5680A [Opt. 03, 28]

| Standard parameters   |   |    | FE-5650A  | FE-5680A            |
|---|---|----|---|---------------------|
| Type  |   |    | 10, SIN   | 10, SIN             |
| Output frequency, MHz   |   |    | 10, SIN   | 10, SIN             |
| Short term stability (Allan deviation)<br>(after 2 hours of continuous operation):          | 1 s                                       |    | $< 1.4 \times 10^{-11}$   |                     |
|   | 10 s                                      |    | $< 5 \times 10^{-12}$   |                     |
|   | 100 s                                     |    | $< 2 \times 10^{-12}$   |                     |
| Operating temperature range (extended range – see options)                                  |   |    | - 5°C ... + 50°C  |                     |
| Stability vs. temperature within operating temperature range                                |   |    | $< \pm 3 \times 10^{-10}$<br>(up to $\pm 1 \times 10^{-10}$ with option 32) |                     |
| Frequency stability vs. power supply changes within $U_s \pm 0,25$ V (for 15...18 V supply) |   |    | $< \pm 2 \times 10^{-11}$   |                     |
| Retrace (2 hours ON – 6 hours OFF – 2 hours ON)   |   |    | $< \pm 5 \times 10^{-11}$   |                     |
| Digital frequency control range (via RS232)   |   |    | $2 \times 10^{-7}$  |                     |
| Aging:  |   |    |   |                     |
|   | - per day                                 |    | $< \pm 2 \times 10^{-11}$ (up to $< \pm 4 \times 10^{-12}$ with opt.28)     |                     |
|   | - per year                                |    | $< \pm 2 \times 10^{-9}$ (up to $< \pm 2 \times 10^{-10}$ with opt. 29)     |                     |
| Power supply, V   |   |    | 5 & 15...18   | 15...18             |
|   |   |    | two power supplies  | single power supply |
| Power consumption @ 25°C, W   | - steady state:                           |    |   |                     |
|   | 15 V                                      |    | 12  | 15                  |
|   | 5 V                                       |    | 2   | -                   |
|   | -warm-up period:                          |    |   |                     |
| 15 V  |   | 34 | 36  |                     |
| 5 V   |   | 2  | -   |                     |
| Warm-up time @ 25°C, min:   |   |    |   |                     |
|   | - to lock                                 |    | $< 5$   |                     |
|   | - within accuracy @ $< 2 \times 10^{-9}$  |    | $< 12$  |                     |
|   | - within accuracy @ $< 5 \times 10^{-10}$ |    | $< 24$  |                     |
| Harmonic suppression, dBc   |   |    | $> 30$  |                     |
| Spurs in $\pm 5$ MHz BW, dBc  |   |    | $< -60$   |                     |
| Phase noise at offset, dBc/Hz (after 2 hours of continuous operation):                      | 10 Hz                                     |    | $< - 100$   | $< - 100$           |
|   | 100 Hz                                    |    | $< - 125$   | $< - 125$           |
|   | 1000 Hz                                   |    | $< - 145$   | $< - 145$           |
| Life time   |   |    | $> 10$ years  |                     |
| Warranty  |   |    | 2 years   |                     |
| Package size, mm  |   |    | 37x77x76  | 25x102x139          |
| Random vibration  |   |    |   |                     |
|   | - frequency rage, Hz                      |    | 20-2000   |                     |
|   | - acceleration, g                         |    | 10  |                     |
| Shock, g/ms   |   |    | 40/11 $\pm$ 4   |                     |
| Non-operating temperature range   |   |    | -55...+75 °C  |                     |
| Humidity  |   |    | 80%   |                     |
| Pressure, Pa (mm Hg)  |   |    | $6 \times 10^4$ (450)   |                     |



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| Available options                      |  |
|--|--|
| Output                                 |  |
| 03                                     | 5 MHz  |
| 04                                     | 15 MHz (only for FE-5650A)   |
| 04A                                    | 20 MHz (only for FE-5650A)   |
| 04B                                    | 5-15 MHz (any frequency, only for FE-5650A, < - 135 dBc/Hz @ 1000 Hz)  |
| 21                                     | Increased output RF level: 1.0 V (+13 dBm), into 50±5 Ohm load *   |
| 69                                     | 1 PPS output   |
| Frequency stability                    |  |
| 28                                     | Aging <±4x10 <sup>-12</sup> /day (after 24...72 hours of continuous operation),<br>Aging <±5x10 <sup>-10</sup> /year (after 30 days of continuous operation) |
| 29                                     | Aging <±2x10 <sup>-10</sup> /year (after 1 year of continuous operation)   |
| Frequency control                      |  |
| 35                                     | 0...5 V (Analog tuning within range of 7x10 <sup>-9</sup> )  |
| Short term stability (Allan deviation) |  |
| 31                                     | <5x10 <sup>-12</sup> per 1 s; <2x10 <sup>-12</sup> per 10 s; <6x10 <sup>-13</sup> per 100 s  |
| 31A                                    | <8x10 <sup>-12</sup> per 1 s; <3x10 <sup>-12</sup> per 10 s; <1x10 <sup>-12</sup> per 100 s  |
| Power supply                           |  |
| 20                                     | 15...18 V single power supply option for FE-5650A. Standard for FE-5680A   |
| 25                                     | 22 – 32 V single power supply option for FE-5650A. N/A for FE-5680A.   |

PLEASE CONTACT US FOR FULL LIST OF OPTIONS

Not all combinations of options are available.

\* Limited availability

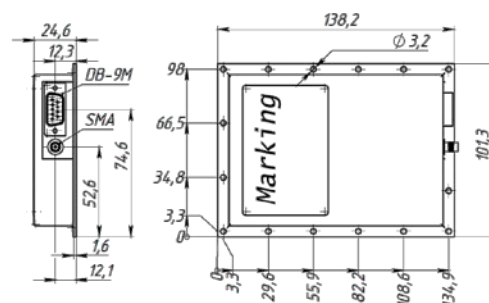
| Operating temperature range |       |       |       |       |       |       |       |       |       |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Option                      | 40    | 39    | 38    | 37    | 36    | 41    | 42    | 43    | 44    |
| <b>FE-5650A</b>             | -55°C | -40°C | -30°C | -20°C | -10°C | +55°C | +60°C | +65°C | +71°C |
| <b>FE-5680A</b>             | -55°C | -40°C | -30°C | -20°C | -10°C | +55°C | +60°C | +65°C | NA    |

**Pin assignment:**

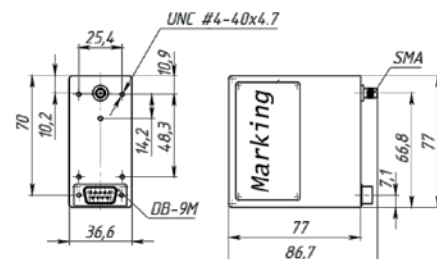
| Pin  | Assignment   |
|------|--|
| J1-1 | + 15 V or<br>+ 22...32 V – for option 25   |
| J1-2 | Ground (case)  |
| J1-3 | Lock indicator   |
| J1-4 | + 5 V (for FE-5650A, excluding option 20) or<br>NC (for FE-5680A & FE-5650A option 20) |
| J1-5 | Ground (case)  |
| J1-6 | NC or 1PPS output for option 69  |
| J1-7 | NC   |
| J1-8 | Remote digital control via RS-232. Data Rx or<br>Analog voltage input for option 35    |
| J1-9 | Remote digital control via RS-232. Data Tx or<br>NC for option 35.                     |
| J2   | RF output, SMA F   |

**Package drawing:**

FE-5680A



FE-5650A



**MORION, Inc.**



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