

# RL 3181.07 / RL 3181.08

## Low phase noise quartz oscillator

low phase noise : - 160 dBc @ 1 kHz

jitter : < 7 fs ( 100 Hz – 10 MHz )

100 MHz OCXO

+ 17 dBm output power

dimensions : 27 x 36 x 20 mm



### General specifications:

|                               |   |            |            |
|-------------------------------|---|------------|------------|
| Standard frequencies          | 80 MHz 100 MHz<br>other frequencies on request    |            |            |
| Frequency stability           | $\leq \pm 3 \times 10^{-7}$ ( 0 ° C to + 55 ° C ) |            |            |
| Output power                  | + 17 dBm $\pm$ 1.5 dB                             |            |            |
| Frequency tuning range        | +/- 3 ppm . . . . +/- 5 ppm                       |            |            |
| Typical phase noise           |   | RL 3181.07 | RL 3181.08 |
|                               | 100Hz   | . < - 133  | . < - 136  |
|                               | 1kHz  | . < -160   | . < -162   |
|                               | 10kHz   | . < -170   | . < -172   |
|                               | 100kHz  | . < -182   | . < -183   |
|                               | 1MHz  | . < -182   | . < -183   |
|                               | 10MHz   | . < -182   | . < -183   |
|                               |   | < 8 fs     | < 6 fs     |
| RMS Jltter [100Hz ... 10 MHz] |   |            |            |
| Tune input                    | 0 . . 11 V  |            |            |
| Output VSWR                   | 2.0 :1 max  |            |            |
| Harmonics                     | < - 35 dBc  |            |            |
| Dimensions millimeters        | 27 x 36 x 20                                      |            |            |
| DC supply                     | +12 VDC $\pm$ 0.5 V                               |            |            |
| Current consumption           | < 0.4 A start up, < 0.2 A operation @ + 25 ° C    |            |            |

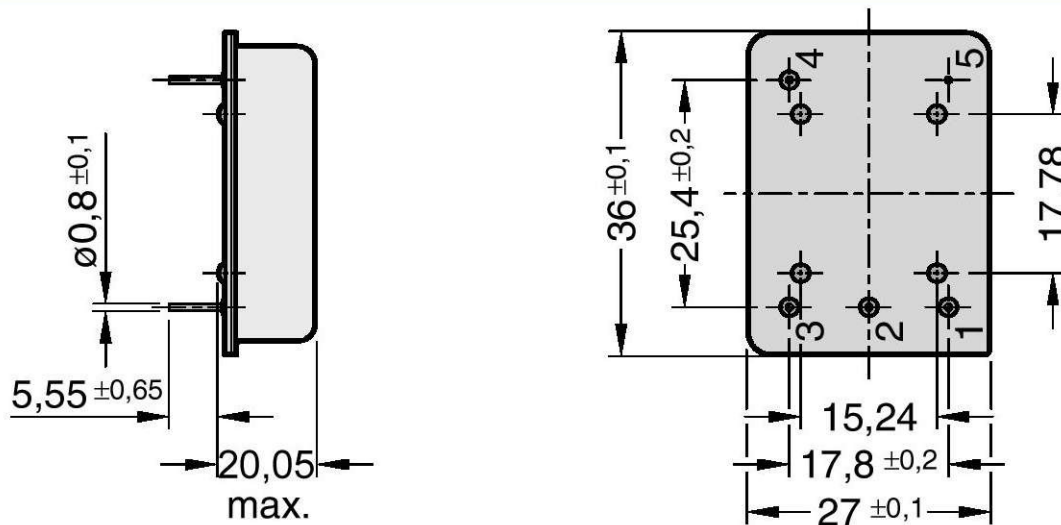
### Environmental Specification:

|                       |                |
|-----------------------|----------------|
| Operating Temperature | 0 to +60degC   |
| Storage Temperature   | -20 to +85degC |

### Options:

# RL 3181.07 / RL 3181.08

## Case drawing



## Pin connection

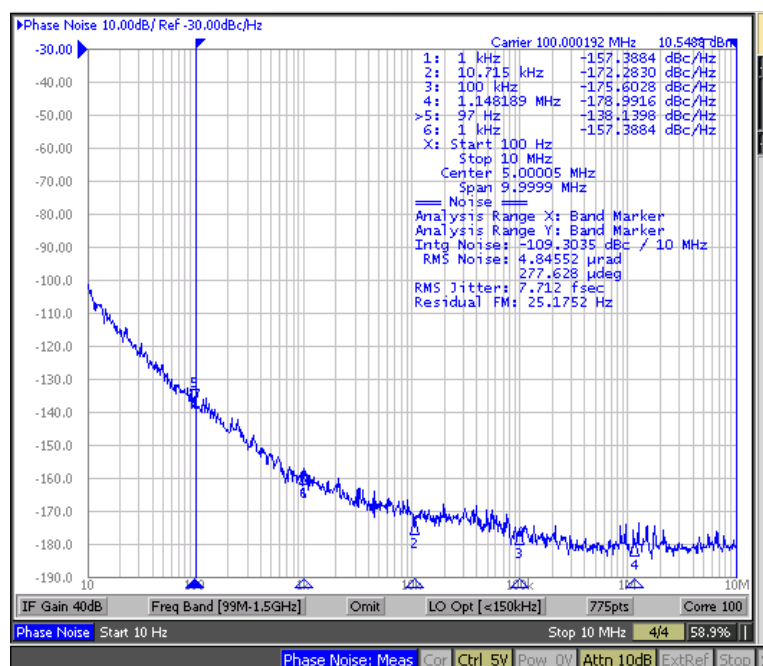
|       | 5 pin |                         |
|-------|-------|-------------------------|
| Pin 1 | Vc    | control voltage         |
| Pin 2 | N. C. | NC or reference voltage |
| Pin 3 | Vs    | Voltage supply          |
| Pin 4 | RF    | Radio frequency         |
| Pin 5 | GND   | Ground                  |

## Marking specification

Line 1: Company  
 Line 2: Article / customer designation  
 Line 3: Frequency  
 Line 4: Series number and date code

**Example:** RALAB  
 RLOCX0120  
 120,000 MHz  
 459 4203

## Typical phase noise plot :



# RL 3181.07 / RL 3181.08

| Specification RL 3181.07-100 / RL 3181.08-100   |   |   |
|---|---|---|
| Nominal Frequency $F_N$ :   | 100.000 MHz   |   |
| Initial frequency tolerance:<br>( $V_C = V_{REF}/2$ ; $T = +25\text{ °C}$ , after power on for 30 min):   | $\leq \pm 3 \times 10^{-7}$   |   |
| Frequency stability<br>in the temperature range $0\text{ °C}$ to $+55\text{ °C}$ :<br>vs. supply voltage changes $V_S \pm 5\%$ :<br>vs. load changes $50\text{ Ohm} \pm 10\%$ : | $\leq \pm 3 \times 10^{-7}$<br>$\leq \pm 1 \times 10^{-8}$<br>$\leq \pm 1 \times 10^{-8}$   |   |
| Aging per year 1. Jahr 0.2 ppm<br>after 1 <sup>st</sup> year 0.2 ppm/ year  | $\leq \pm 1 \times 10^{-8}$   |   |
| Frequency tuning range:   | $\geq \pm 3\text{ ppm}$   |   |
| Frequency control voltage range $V_C$ :   | 1 V to + 10 V @ 100 kohm  |   |
| Supply voltage $V_S$ :  | +12.0 V DC $\pm 0.5\text{ V}$   |   |
| Supply current $I_S$<br>steady state @ $+25\text{ °C}$ :<br>during warm-up:   | $\leq 200\text{ mA}$<br>$\leq 400\text{ mA}$  |   |
| Warm up time:<br>(to $dF/F_0 \leq \pm 5 \times 10^{-8}$ referred to $F_0$ after 1 hour)   | $\leq 5\text{ min}$   |   |
| Output signal type:<br>Output level:<br>Output load impedance:  | Sine wave<br>$\geq +17\text{ dBm}$<br>$50\text{ Ohm} \pm 10\%$  |   |
| Harmonics:<br>Spurious (100 Hz to 5 MHz):   | $\leq -35\text{ dBc}$<br>$\leq -80\text{ dBc}$  |   |
| Phase noise:  | RL 3181.07  | RL 3181.08  |
| 100 Hz:<br>1 kHz:<br>10 kHz:<br>100 kHz:<br>1 MHz:  | $\leq -133\text{ dBc / Hz}$<br>$\leq -160\text{ dBc / Hz}$<br>$\leq -170\text{ dBc / Hz}$<br>$\leq -182\text{ dBc / Hz}$<br>$\leq -182\text{ dBc / Hz}$ | $\leq -136\text{ dBc / Hz}$<br>$\leq -162\text{ dBc / Hz}$<br>$\leq -172\text{ dBc / Hz}$<br>$\leq -183\text{ dBc / Hz}$<br>$\leq -183\text{ dBc / Hz}$ |
| Temperature ranges<br>Operating:<br>Storage:  | $0\text{ °C} \dots +60\text{ °C}$<br>$-20\text{ °C} \dots +85\text{ °C}$  |   |



| <b>Specification RL 3181.02-100</b>   |   |
|---|---|
| Nominal Frequency $F_N$ :   | 100.000 MHz   |
| Initial frequency tolerance:<br>( $V_C = V_{REF}/2$ ; $T = +25\text{ °C}$ , after power on for 30 min):   | $\leq \pm 3 \times 10^{-7}$   |
| Frequency stability<br>in the temperature range $0\text{ °C}$ to $+55\text{ °C}$ :<br>vs. supply voltage changes $V_S \pm 5\%$ :<br>vs. load changes $50\text{ Ohm} \pm 10\%$ : | $\leq \pm 3 \times 10^{-7}$<br>$\leq \pm 1 \times 10^{-8}$<br>$\leq \pm 1 \times 10^{-8}$   |
| Aging (after 30 days of continuous operation):<br>per day:  | $\leq \pm 1 \times 10^{-8}$   |
| Frequency tuning range:   | $\geq \pm 1.5\text{ ppm}$   |
| Frequency control voltage range $V_C$ :   | 0 V to + 10 V   |
| Supply voltage $V_S$ :  | $+12.0\text{ V} \pm 5\%$  |
| Supply current $I_S$<br>steady state @ $+25\text{ °C}$ :<br>during warm-up:   | $\leq 100\text{ mA}$<br>$\leq 200\text{ mA}$  |
| Warm up time:<br>(to $dF/F_0 \leq \pm 5 \times 10^{-8}$ referred to $F_0$ after 1 hour)   | $\leq 5\text{ min}$   |
| Output signal type:<br>Initial output level:<br>Output load impedance:  | Sine wave<br>$\geq +13\text{ dBm}$<br>$50\text{ Ohm} \pm 10\%$  |
| Harmonics:<br>Spurious (100 Hz to 5 MHz):   | $\leq -25\text{ dBc}$<br>$\leq -90\text{ dBc}$  |
| Phase noise:<br>100 Hz:<br>1 kHz:<br>10 kHz:<br>100 kHz:<br>1 MHz:  | $\leq -130\text{ dBc / Hz}$<br>$\leq -162\text{ dBc / Hz}$<br>$\leq -170\text{ dBc / Hz}$<br>$\leq -174\text{ dBc / Hz}$<br>$\leq -178\text{ dBc / Hz}$ |
| Temperature ranges<br>Operating:<br>Storage:  | $0\text{ °C} \dots +55\text{ °C}$<br>$-35\text{ °C} \dots +85\text{ °C}$  |

RL 3181.10

## Low phase noise quartz oscillator G - sensitivity optimised

low phase noise : - 162 dBc @ 1 kHz

low G - sensitivity

100 MHz OCXO

+ 13 dBm output power

dimensions : 27 x 36 x 20 mm



### General specifications:

|                                    |  |       |        |      |        |       |        |        |        |      |        |       |        |
|------------------------------------|--|-------|--------|------|--------|-------|--------|--------|--------|------|--------|-------|--------|
| Standard frequencies               | 100 MHz<br>other frequencies on request  |       |        |      |        |       |        |        |        |      |        |       |        |
| Frequency stability                | $\leq \pm 3 \times 10^{-7}$ ( 0 ° C to + 55 ° C )  |       |        |      |        |       |        |        |        |      |        |       |        |
| Output power                       | > + 13 dBm   |       |        |      |        |       |        |        |        |      |        |       |        |
| Frequency tuning range             | +/- 1.5 ppm . . . . +/- 3 ppm  |       |        |      |        |       |        |        |        |      |        |       |        |
| Typical phase noise                | <table><tr><td>100Hz</td><td>&lt; -130</td></tr><tr><td>1kHz</td><td>&lt; -162</td></tr><tr><td>10kHz</td><td>&lt; -170</td></tr><tr><td>100kHz</td><td>&lt; -174</td></tr><tr><td>1MHz</td><td>&lt; -178</td></tr><tr><td>10MHz</td><td>&lt; -178</td></tr></table> | 100Hz | < -130 | 1kHz | < -162 | 10kHz | < -170 | 100kHz | < -174 | 1MHz | < -178 | 10MHz | < -178 |
| 100Hz                              | < -130   |       |        |      |        |       |        |        |        |      |        |       |        |
| 1kHz                               | < -162   |       |        |      |        |       |        |        |        |      |        |       |        |
| 10kHz                              | < -170   |       |        |      |        |       |        |        |        |      |        |       |        |
| 100kHz                             | < -174   |       |        |      |        |       |        |        |        |      |        |       |        |
| 1MHz                               | < -178   |       |        |      |        |       |        |        |        |      |        |       |        |
| 10MHz                              | < -178   |       |        |      |        |       |        |        |        |      |        |       |        |
| G – Sensitivity ( all three axis ) | $\leq 1 \times 10^{-9} / g$  |       |        |      |        |       |        |        |        |      |        |       |        |
| Tune input                         | 0 . . 10 V   |       |        |      |        |       |        |        |        |      |        |       |        |
| Output VSWR                        | 2.0 :1 max   |       |        |      |        |       |        |        |        |      |        |       |        |
| Harmonics                          | < - 25 dBc   |       |        |      |        |       |        |        |        |      |        |       |        |
| Dimensions millimeters             | 27 x 36 x 20   |       |        |      |        |       |        |        |        |      |        |       |        |
| DC supply                          | +12 VDC $\pm$ 5 %  |       |        |      |        |       |        |        |        |      |        |       |        |
| Current consumption                | < 0.2 A start up, < 0.1 A operation @ + 25 ° C   |       |        |      |        |       |        |        |        |      |        |       |        |

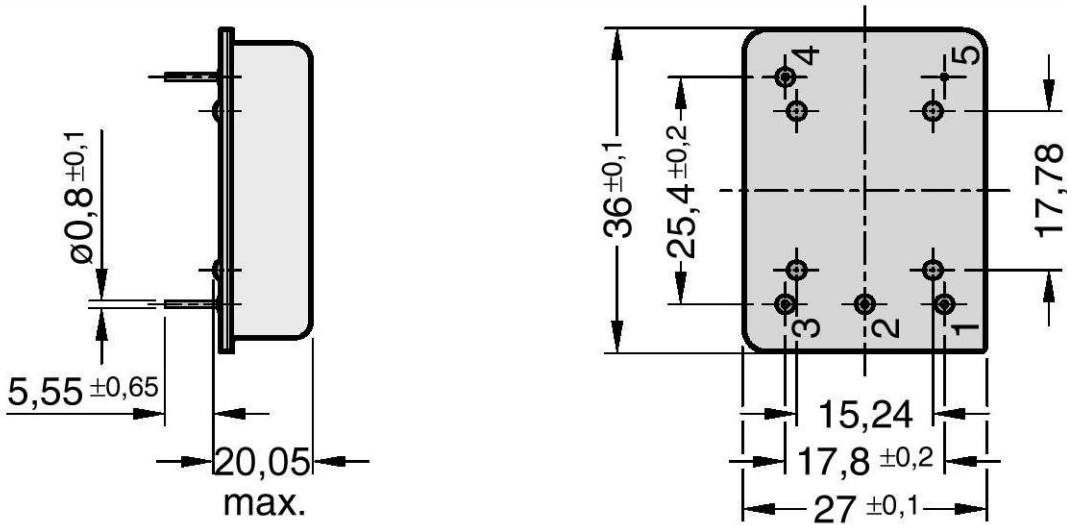
### Environmental Specification:

|                       |                |
|-----------------------|----------------|
| Operating Temperature | 0 to +60degC   |
| Storage Temperature   | -20 to +85degC |

### Options:

# RL 3181.10

## Case drawing



## Pin connection

|       | 5 pin |                         |
|-------|-------|-------------------------|
| Pin 1 | Vc    | control voltage         |
| Pin 2 | N. C. | NC or reference voltage |
| Pin 3 | Vs    | Voltage supply          |
| Pin 4 | RF    | Radio frequency         |
| Pin 5 | GND   | Ground                  |

## Marking specification

Line 1: Company  
Line 2: Article / customer designation  
Line 3: Frequency  
Line 4: Series number and date code

**Example:** RALAB  
RLOCXO120  
120,000 MHz  
459 4203

# RL 3181.10

| <b>Specification RL 3181.10-100</b>   |   |
|---|---|
| Nominal Frequency $F_N$ :   | 100.000 MHz   |
| Initial frequency tolerance:<br>( $V_C = V_{REF}/2$ ; $T = +25\text{ °C}$ , after power on for 30 min):   | $\leq \pm 3 \times 10^{-7}$   |
| Frequency stability<br>in the temperature range $0\text{ °C}$ to $+55\text{ °C}$ :<br>vs. supply voltage changes $V_S \pm 5\%$ :<br>vs. load changes $50\text{ Ohm} \pm 10\%$ : | $\leq \pm 3 \times 10^{-7}$<br>$\leq \pm 1 \times 10^{-8}$<br>$\leq \pm 1 \times 10^{-8}$   |
| Aging (after 30 days of continuous operation):<br>per day:  | $\leq \pm 1 \times 10^{-8}$   |
| Frequency tuning range:   | $\geq \pm 1.5\text{ ppm}$   |
| Frequency control voltage range $V_C$ :   | 0 V to + 10 V   |
| Modulation Bandwidth (-3 dB):   | $\geq 1\text{ kHz}$   |
| Supply voltage $V_S$ :  | +12.0 V DC $\pm 5\%$  |
| Supply current $I_S$<br>steady state @ $+25\text{ °C}$ :<br>during warm-up:   | $\leq 100\text{ mA}$<br>$\leq 200\text{ mA}$  |
| Warm up time:<br>(to $dF/F_0 \leq \pm 5 \times 10^{-8}$ referred to $F_0$ after 1 hour)   | $\leq 5\text{ min}$   |
| Output signal type:<br>Output level:<br>Output load impedance:  | Sine wave<br>$\geq +13\text{ dBm}$<br>$50\text{ Ohm} \pm 10\%$  |
| Harmonics:<br>Spurious (100 Hz to 5 MHz):   | $\leq -25\text{ dBc}$<br>$\leq -90\text{ dBc}$  |
| Phase noise:  |   |
| 100 Hz:<br>1 kHz:<br>10 kHz:<br>100 kHz:<br>1 MHz:  | $\leq -130\text{ dBc / Hz}$<br>$\leq -162\text{ dBc / Hz}$<br>$\leq -170\text{ dBc / Hz}$<br>$\leq -174\text{ dBc / Hz}$<br>$\leq -178\text{ dBc / Hz}$ |
| G-Sensitivity (all three axis) :  | $\leq 1 \times 10^{-9}/g$   |
| Temperature ranges<br>Operating:<br>Storage:  | $0\text{ °C} \dots +60\text{ °C}$<br>$-20\text{ °C} \dots +70\text{ °C}$  |
| MTBF ( $T_A = +35\text{ °C}$ ) acc. to MIL-HDBK-217F:   | > 500,000 hours   |

## high stability reference oscillator

10 MHz high performance OCXO

low phase noise : - 165 dBc @ 1 kHz

Frequency stability :  $\leq \pm 5 \times 10^{-9}$

dimensions : 27 x 36 x 20 mm



### General specifications:

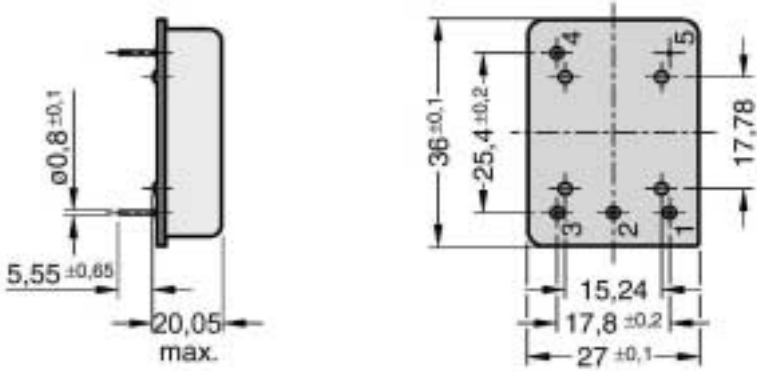
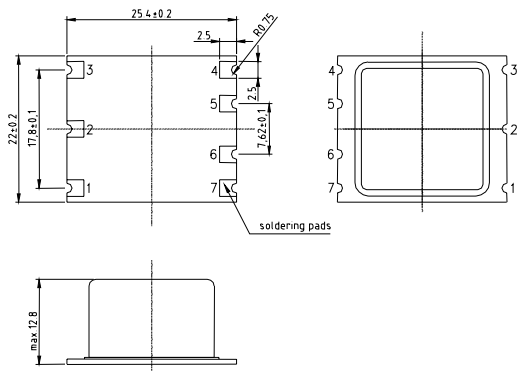
|                                |   |                    |                    |                    |
|--------------------------------|---|--------------------|--------------------|--------------------|
| Standard frequencies           | 10 MHz  |                    |                    |                    |
| Frequency stability            | $\leq \pm 5 \times 10^{-9}$ ( -20 ° C to + 75 ° C ) |                    |                    |                    |
| Output power                   | > + 7 dBm   |                    |                    |                    |
| Frequency tuning range         | +/- 0.5 ppm . . . +/- 1.5 ppm                       |                    |                    |                    |
| Typical phase noise [dBc]      |   | RL3181.11          | RL3181.12          | RL3181.13          |
|                                | 1 Hz:   | $\leq -105$ dBc/Hz | $\leq -103$ dBc/Hz | $\leq -100$ dBc/Hz |
|                                | 10 Hz:  | $\leq -135$ dBc/Hz | $\leq -132$ dBc/Hz | $\leq -130$ dBc/Hz |
|                                | 100 Hz:   | $\leq -155$ dBc/Hz | $\leq -150$ dBc/Hz | $\leq -150$ dBc/Hz |
|                                | 1 kHz:  | $\leq -165$ dBc/Hz | $\leq -165$ dBc/Hz | $\leq -165$ dBc/Hz |
|                                | 10 kHz:   | $\leq -165$ dBc/Hz | $\leq -165$ dBc/Hz | $\leq -165$ dBc/Hz |
|                                | 100 kHz:  | $\leq -165$ dBc/Hz | $\leq -165$ dBc/Hz | $\leq -165$ dBc/Hz |
| Tune input                     | 0 . . + 5 V   |                    |                    |                    |
|                                |   |                    |                    |                    |
| Harmonics                      | < - 20 dBc  |                    |                    |                    |
| Dimensions millimeters         | 27 x 36 x 20  |                    |                    |                    |
| DC supply                      | +12 VDC $\pm$ 0.5 V                                 |                    |                    |                    |
| Current consumption @ + 25 ° C | < 0.4 A warm up,<br>< 0.1 A operation               |                    |                    |                    |

### Environmental Specification:

|                       |                              |
|-----------------------|------------------------------|
| Operating Temperature | -20 to +75degC               |
| Storage Temperature   | -40 to +85degC               |
| Options:              | SMD case                     |
| Order examples :      | RL3181.11<br>RL3181.11 - SMD |



| 1. Specification   |   |                            |                            |
|--|---|----------------------------|----------------------------|
| Nominal Frequency $F_N$ :  | 10.000 MHz  |                            |                            |
| Frequency stability<br>in the temperature range -20 °C to +75 °C:<br>vs. supply voltage changes $V_S \pm 5\%$ :<br>vs. load changes 50 Ohm $\pm 5\%$ : | $\leq \pm 5 \times 10^{-9}$<br>$\leq \pm 5 \times 10^{-10}$<br>$\leq \pm 5 \times 10^{-10}$                               |                            |                            |
| Aging (after 30 days of continuous operation):<br>per day:<br>per month:<br>1st year:<br>15 years:   | $\leq \pm 5 \times 10^{-10}$<br>$\leq \pm 5 \times 10^{-9}$<br>$\leq \pm 3 \times 10^{-8}$<br>$\leq \pm 5 \times 10^{-7}$ |                            |                            |
| Frequency control range :  | $\pm 0.5 \text{ ppm} \dots \pm 1.5 \text{ ppm}$   |                            |                            |
| Control voltage $V_C$ :  | 0 V ... +5 V  |                            |                            |
| Pulling slope $dF/dV_C$ :  | positive  |                            |                            |
| Tuning coverage :  | $\geq 15 \text{ years}$   |                            |                            |
| Supply voltage $V_S$ :   | $+12.0 \text{ V} \pm 5\%$   |                            |                            |
| Supply current $I_S$ :<br>steady state @ $T_A = +25\text{ °C}$ :<br>during warm-up:  | $\leq 100 \text{ mA}$<br>$\leq 400 \text{ mA}$  |                            |                            |
| Warm up time @ $T_A = +25\text{ °C}$<br>to $dF/F < \pm 5 \times 10^{-8}$ referred to final frequency<br>after 1 hour:                                  | $\leq 5 \text{ min}$  |                            |                            |
| Output voltage :<br>level:<br>load :   | sine wave<br>$\geq +7 \text{ dBm}$<br>50 Ohm  |                            |                            |
| Harmonics:<br>Spurious (100 Hz to 1 MHz from carrier):   | $\leq -20 \text{ dBc}$<br>$\leq -100 \text{ dBc}$   |                            |                            |
| Phase Noise :  | RL3181.11   | RL3181.12                  | RL3181.13                  |
| 1 Hz:  | $\leq -105 \text{ dBc/Hz}$  | $\leq -103 \text{ dBc/Hz}$ | $\leq -100 \text{ dBc/Hz}$ |
| 10 Hz:   | $\leq -135 \text{ dBc/Hz}$  | $\leq -132 \text{ dBc/Hz}$ | $\leq -130 \text{ dBc/Hz}$ |
| 100 Hz:  | $\leq -155 \text{ dBc/Hz}$  | $\leq -150 \text{ dBc/Hz}$ | $\leq -150 \text{ dBc/Hz}$ |
| 1 kHz:   | $\leq -165 \text{ dBc/Hz}$  | $\leq -165 \text{ dBc/Hz}$ | $\leq -165 \text{ dBc/Hz}$ |
| 10 kHz:  | $\leq -165 \text{ dBc/Hz}$  | $\leq -165 \text{ dBc/Hz}$ | $\leq -165 \text{ dBc/Hz}$ |
| 100 kHz:   | $\leq -165 \text{ dBc/Hz}$  | $\leq -165 \text{ dBc/Hz}$ | $\leq -165 \text{ dBc/Hz}$ |
| Short term stability (Allan Variance)<br>@ $\tau = 1 \text{ sec}$ :<br>@ $\tau = 10 \text{ sec}$ :<br>@ $\tau = 100 \text{ sec}$ :                     | $\leq 5.0 \times 10^{-12}$<br>$\leq 1.0 \times 10^{-11}$<br>$\leq 1.0 \times 10^{-10}$                                    |                            |                            |
| Temperature ranges<br>Operating:<br>Operable:<br>Storage:  | -20 °C ... +75 °C<br>-30 °C ... +80 °C<br>-40 °C ... +85 °C   |                            |                            |

| 2. Marking  |  |
|---|--|
| date code (week/year); Nominal frequency  |  |
| 3. Case   |  |
| <p><b>Case style: 27 x 36 mm</b></p>    | <p><b>Pin configuration</b></p> <ol style="list-style-type: none"> <li>1. V tune</li> <li>2. N.C. or reference voltage</li> <li>3. Voltage supply</li> <li>4. RF output</li> <li>5. Ground</li> </ol>                            |
| <p><b>Case style: SMD</b></p>  <p>max. height: 12.8 mm; max. weight: 40 gram</p> | <p><b>Pin configuration</b></p> <ol style="list-style-type: none"> <li>1. RF output</li> <li>2. Oven Alarm out</li> <li>3. Ground</li> <li>4. Vref out</li> <li>5. Vadj in</li> <li>6. Osc – enable in</li> <li>7. Vs</li> </ol> |