

RK205 5032

This radiation tolerant 5 x 3.2 mm hermetically sealed SMD VCXO is specifically designed for missions where resistance to demanding environment, short lead-time and radiation tolerance are required. It combines a very low RMS phase jitter, tight frequency stability and is available with different types of FM screening options.

Features

- Free from export restrictions
- TID limit of 72/100 kRad and latch-up free till 32.4/62 MeV
- Hermetically sealed package
- Frequency range: 8-1500 MHz
- Low consumption: 30 mA
- Supply voltage: 2.5 or 3.3 V
- AFD¹ ±50 ppm over -40°C to +85°C
- Different screening options

Applications

- Missions where TID limit of 72/100 kRad and latch-up free till 32.4/62 MeV are required
- Rugged environment

5.0 x 3.2 mm



1. Environmental Conditions

| Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit |
|---|--|-----------------------------|-------------------------------|-------------------------------|--------------------------------|
| Operating temperature | Option I: -40°C to 85°C Option M: -55°C to 125°C | -40 -55 | 25 25 | 85 125 | °C |
| Switch-on temperature | TS ₀ | -55 | | 125 | °C |
| Non-operating temperature | TNO _p | -55 | | 125 | °C |
| Mechanical shock | MIL-STD-883, Method 2002 (1500 g, 0.5 ms) | | | | |
| Humidity | After 48 hours at 85°C ±2°, 85% relative humidity non-condensing | | | | |
| Temperature cycling | MIL-STD-883, Method 1010.8 (-55°C, +125°C, 1000 cycles) | | | | |
| Vibration | MIL-STD-883, Method 2007 (20 g, 3 different axis, 4 times) | | | | |
| Gross and fine leak | MIL-STD-883, Method 1014 | | | | |
| RoHS compliant | Yes | | | | |
| Radiation: Products have been tested up to the following levels without any events | | | | | |
| | | TID (LDR as per ESICC22900) | SEL (MeV/mg/cm ²) | SET (MeV/mg/cm ²) | SEFI (MeV/mg/cm ²) |
| | CMOS | 100 kRad | 32.4 | 20 | 62.5 |
| | LVDS | 72 kRad | 32.4 | 10 | 62.5 |
| | LVPECL | 72 kRad | 62.5 | 10 | 62.5 |

2. Frequency Characteristics

| Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit |
|--|---|------|------|------------|------|
| AFD ¹ option | Option I: -40°C to 85°C Option M: -55°C to 125°C | | | ±50 ±75 | ppm |
| Initial frequency accuracy (FVT ² option) | | | | ±15 | ppm |
| Frequency stability over temperature (FVT) | Option I: -40°C to 85°C Option M: -55°C to 125°C | | | ±30 ±50 | ppm |
| Supply voltage stability (FVT) | Over operating temperature | | | ±3 | ppm |
| Load sensitivity (FVT) | Over operating temperature | | | ±5 | ppm |
| Ageing (FVT) | Over 10 years | | | ±15 | ppm |
| Start-up time | | | | 10 | ms |

¹ AFD: Absolute Frequency Drift. It includes initial accuracy + temperature range + supply variation + load variation + ageing over 10 years.

² FVT: Frequency Vs. Temperature.

3. Electrical Interface

| Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit |
|---------------------------------|--|---------------|----------------|---------------|------|
| Power supply (V _{DD}) | Option 2: 2.5 V Option 3: 3.3 V | 2.375 2.97 | 2.5 3.3 | 2.625 3.63 | V |
| Stead state input current power | CMOS output: LVDS output LVPECL output | | 20 23 54 | | mA |

4. Control Voltage (V_c)

| Parameter | Min. | Typ. | Max. | Unit | Test Condition / Description |
|-----------------------------------|------|------|------|------|--|
| Absolute Pull Range (APR) | ±50 | | | ppm | |
| Total pull range | | | 400 | ppm | Frequency shift from minimum to maximum V _c |
| Control voltage (V _c) | 0.3 | 1.65 | 3.0 | V | |
| Linearity | | | 15 | % | V _c from 0.3 to 3V |
| Slope | | | | | Positive only |
| Modulation BW | 10 | | | kHz | V _c from 0.3 to 3V |
| Input impedance | 1 | | | MΩ | |

5. Output Characteristics – CMOS³

| Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit |
|-----------------------------------|-----------------------------|---------------------|------|---------------------|------|
| Nominal frequency | CMOS output | 8 | | 200 | MHz |
| Output voltage (V _{OL}) | 15pf load | | | 10% V _{DD} | V |
| Output voltage (V _{OH}) | 15pf load | 90% V _{DD} | | | V |
| Duty cycle | @50% V _{DD} | 48 | | 52 | % |
| Rise time / Fall time | 90% to 10% V _{CC} | | | 3 | ns |
| RMS Phase Jitter | Integrated 12 kHz to 20 MHz | | 0.9 | 2.5 | ps |

6. Output Characteristics – LVPECL

| Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit |
|-----------------------------------|---|-------------------------|------|------------------------|------|
| Nominal frequency | LVPECL output | 8 | | 1500 | MHz |
| Output voltage (V _{OL}) | 50Ω nominal load | | | V _{DD} – 1.6V | V |
| Output voltage (V _{OH}) | 50Ω nominal load | V _{DD} – 1.03V | | | V |
| Duty cycle | @ V _{DD} – 1.03V (45 to 55% over 600 MHz) | 48 | | 52 | % |
| Rise time / Fall time | 80% to 20% V _{CC} | | | 0.6 | ns |
| RMS Phase Jitter | Integrated 12 kHz to 20 MHz | | 0.9 | 2.5 | ps |

³ The CMOS output is TTL compatible with the 3.3 V supply voltage.

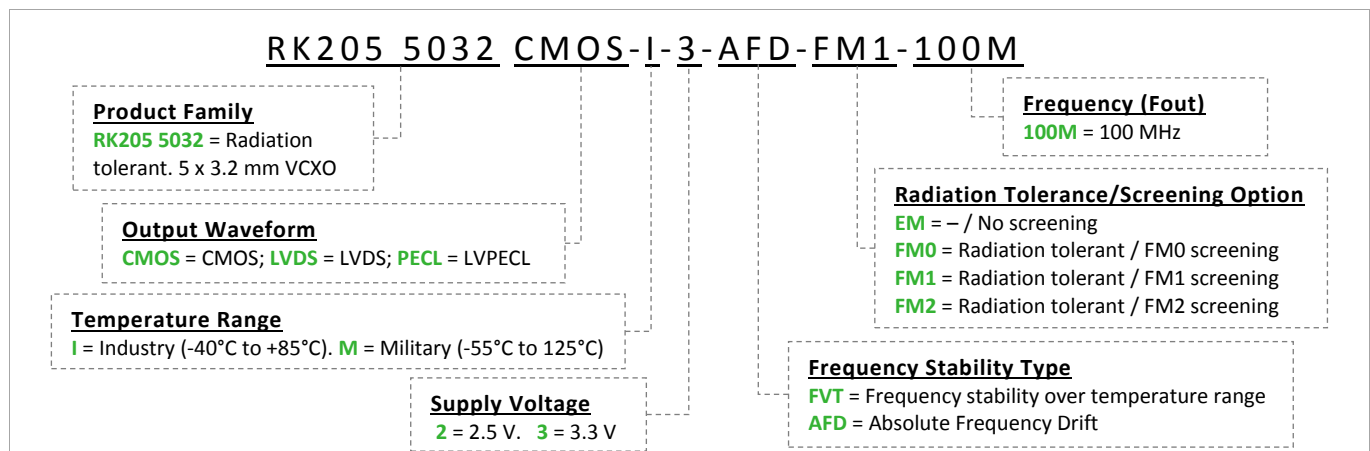
7. Output Characteristics – LVDS

| Parameter | Condition / Remarks | Min. | Typ. | Max. | Unit |
|-----------------------|---|------|------|------|------|
| Nominal frequency | LVDS output | 8 | | 1500 | MHz |
| Output voltage | Voltage swing (V _{od}) | | 350 | | mV |
| Duty cycle | Measured @ 1.25 V (45 to 55% over 150 MHz) | 48 | | 52 | % |
| Rise time / Fall time | RL = 100 Ω / CL = 10 pF | | | 0.6 | ns |
| RMS Phase Jitter | Integrated 12 kHz to 20 MHz | | 0.9 | 2.5 | ps |

8. Screening Options

| Screening Operation | Requirements and Condition | Options | | | |
|------------------------------------|--|----------------|----------------|----------------|-----------|
| | | EM | FM0 | FM1 | FM2 |
| Stabilization bake (prior to seal) | MIL-STD-883 method 1008, conduction C | – | 24h@150°C | 24h@150°C | 24h@150°C |
| Thermal shocks | MIL-STD-883, method 1011, condition A | – | ✓ | ✓ | ✓ |
| Temperature cycling | MIL-STD-883, method 1010, condition B | – | ✓ | ✓ | ✓ |
| Constant acceleration | MIL-STD-883, method 1010, condition A Acceleration: 5000g, curing 60s in direction Y1 | – | ✓ | ✓ | ✓ |
| PIND test | MIL-STD-883, method 2020, condition B | ✓ | ✓ | ✓ | ✓ |
| Seal test | Fine leak: MIL-STD-883, method 1014, condition A2 | ✓ | ✓ | ✓ | ✓ |
| | Gross leak: CEI 68-2-17 Test Qc, Method 1 | ✓ | ✓ | ✓ | ✓ |
| Pre burn-in measurement | Following the guidelines of MIL-PRF-55310, §4.8.5, §4.8.6, §4.8.11, and §4.8.20 | ✓ ⁴ | ✓ ⁵ | ✓ ⁵ | ✓ |
| Burn-in | Temperature: +125°C Pressure: Patm Supply Voltage: Vcc nom Load: Load nom | – | – | 160h min. | 160h min. |
| Post burn-in measurement | Following the guidelines of MIL-PRF-55310 | – | – | ✓ | ✓ |
| PDA | | – | – | 20% | 10% |
| External visual Inspection | MIL-STD-883, Method 2009 | – | – | ✓ | ✓ |

9. Ordering Part Example

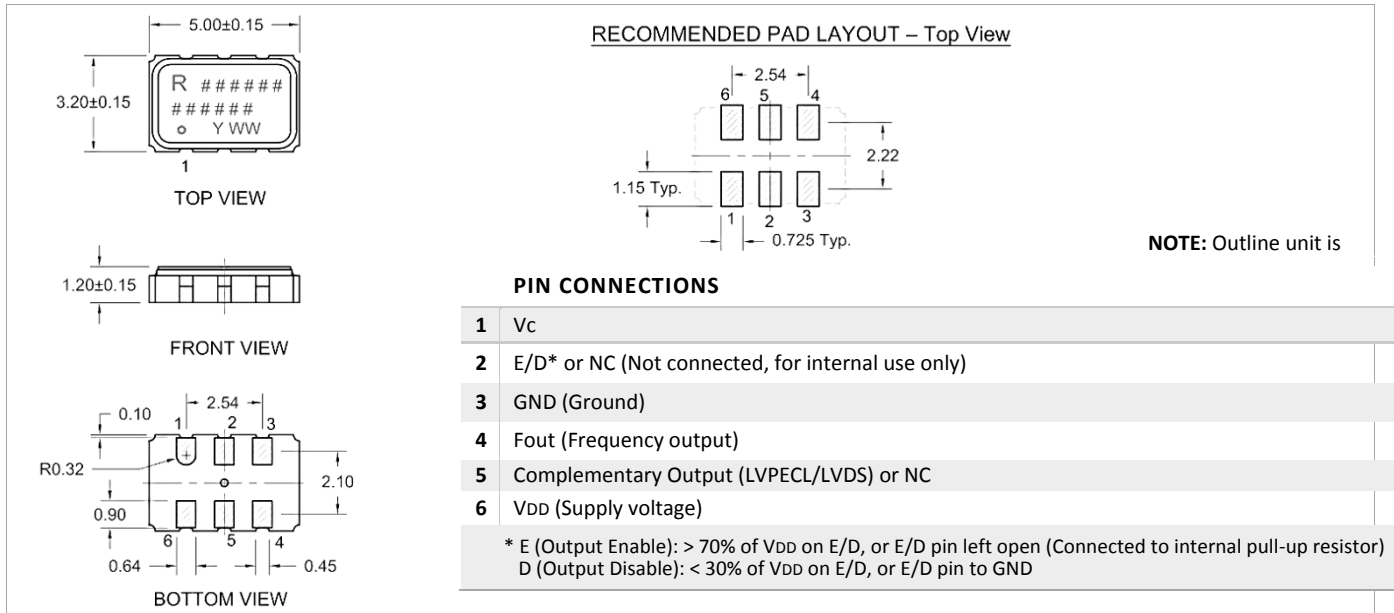


⁴ Electrical verification.

⁵ MIL-STD-105E general inspection level | AQL level 1.0.

▶ 100 pcs batch: test on 13 pcs / 0 rejected. ▶ 500 pcs batch: test on 20 pcs / 0 reject accepted. ▶ 1000 pcs batch: test on 50 pcs / 1 reject accepted.

10. Model Outline, Pin Connections and Recommended Pad Layout



11. Marking

| Parameter | Test Condition / Description |
|-------------|--|
| Top line | [R #####] R and part identifier |
| Middle line | [#####] Part information |
| Bottom line | [o YWW] Pin 1, Year code* and Week code** Year code*: A = 2010, B = 2011, C = 2012, D = 2013, ... Z = 2035 Week code**: WW = 01 = Week of first Monday of the year |

12. Manufacturing Information

