RK105 5032

Radiation Tolerant XO

Specific request can be addressed to RAKON hi.rel@rakon.com

Product Description

This radiation tolerant 5x3.2mm hermetically sealed SMD XO is specially designed for missions where resistance to demanding environment, short lead-time and radiation tolerance are required. It combines a very low RMS jitter, a tight stability and is available with different types of FM screenings.

Features

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

Applications

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

Specifications

1. Environmental conditions

Parameter	Conditions/remarks	Min	Nom	Max	Unit
Operating Temperature	Option I (–40°C to +85°C)	-40	25	85	°C
	Option M (–55°C to +125°C)	-55	25	125	°C
Switch-on Temperature	TSo	-55		125	°C
Non-Operating Temperature	TNOp	-55		125	°C
Mecanical shock	MIL-STD-883, Method 2002 (1500g, 0.5ms)				
Humidity	After 48 hours at 85°C +/-2°C, 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 (20g, 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 ESCC22900)	SEL (MeV/mg/cm^2)	SET (MeV/mg/cm^2)	SEFI (MeV/mg/cm^2)
	CMOS	100kRad	32.4	20	62.5
	LVDS	72kRad	32.4	10	62.5
	LVPECL	72kRad	62.5	10	62.5

2. Electrical interface

Parameters	Conditions/remarks	Min	Nom	Max	Unit
Supply voltage (VDD)	Option 2 (2.5 V)	2.375	2.5	2.625	V
	Option 3 (3.3 V)	2.97	3.3	3.63	V
Steady state input current power	CMOS output		20		mA
	LVDS output		23		mA
	LVPECL output		54		mA

3. Frequency characteristics

Parameters	Conditions/Remarks	Min	Typ	Max	Unit
AFD option (Note 1)	Temperature option I (–40°C to +85°C)			± 50	ppm
	Temperature option M (–55°C to +125°C)			± 75	ppm
Initial frequency accuracy (FVT option only)				± 15	ppm
Frequency-temperature stability (FVT option only)	Temperature option I (–40°C to +85°C)			± 30	ppm
	Temperature option M (–55°C to +125°C)			± 50	ppm
Frequency variation vs. supply voltage (FVT option only)	Over Operating Temperature			± 3	ppm
Frequency variation vs. load (FVT option only)	Over Operating Temperature			± 5	ppm
Frequency ageing (FVT option only)	Over 10 years			± 15	ppm
Start up time				10	ms

Note 1: AFD includes initial accuracy+temp range+supply variation+load variation+ageing over 10 years
AFD: Absolute Frequency Drift / FVT: Frequency Vs. Temperature

4. Output characteristics CMOS

Parameters	Conditions/Remarks	Min	Typ	Max	Unit
Nominal Frequency	CMOS output	8		200	MHz
Output voltage	Vol/15pf load			10	%VDD
	Voh/15pF load	90			%VDD
Duty cycle	@50%VDD	48		52	%
Rise time/Fall time	90%-10%			3	ns
RMS Phase Jitter	Integrated 12kHz to 20MHz		0.9	2.5	ps

N.B: the CMOS output is TTL compatible with the 3.3V supply voltage

5. Output characteristics LVPECL

Parameters	Conditions/Remarks	Min	Typ	Max	Unit
Nominal Frequency	LVPECL output	8		1500	MHz
Output voltage	Vol/50Ω nominal load. max			VDD - 1.6V	
	Vol/50Ω nominal load. min	VDD - 1.03V			
Duty cycle	@ VDD-1.3V (45 to 55% over 600MHz)	48		52	%
Rise time/Fall time	80%-20%			0.6	ns
RMS Phase Jitter	Integrated 12kHz to 20MHz		0.9	2.5	ps

6. Output characteristics LVDS

Parameters	Conditions/Remarks	Min	Typ	Max	Unit
Nominal Frequency	LVDS output	8		1500	MHz
Output voltage	Voltage swing (VoD)		350		mV
Duty cycle	Measured at 1.25V (45 to 55% over 150MHz)	48		52	%
Rise time/Fall time	RL = 100Ω / CL = 10pF			0.6	ns
RMS Phase Jitter	Integrated 12kHz to 20MHz		0.9	2.5	ps

7. Screening options

Screening Operation	Requirements & Conditions	OPTIONS			
		EM	FM0 (RadHard)	FM1 (RadHard)	FM2 (RadHard)
Stabilization bake (prior to seal)	MIL STD 883 method 1008, Condition 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 2001, condition A Acceleration: 5000g, during 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 MIL-STD-883 , method 1014, condition C	√	√	√	√
Pre burn-in measurement	MIL PRF 55310, §4.8.5 MIL PRF 55310, §4.8.21	(1)	(2)	(2)	√
Burn-in	Temperature: +125°C Pressure: PAtm Supply Voltage: VccNom Load: LoadNom	-	-	160h min.	160h min.
Post burn-in measurement	MIL PRF 55310, §4.8.5 MIL PRF 55310, §4.8.21	-	-	√	√
PDA		-	-	20%	10%
External Visual Inspection	MIL-STD-883 , Method 2009	-	-	√	√

(1) Electrical verification
(2) MIL-STD105E General inspection level I AQL level 1.0
100pcs batch: test on 13pcs / 0 reject accepted
500pcs batch: test on 20pcs / 0 reject accepted
1000pcs batch: test on 50pcs / 1 reject accepted

8. Pin connections

Pin number	Name	Description
1,2	NC	Not connected/for internal use
3	GND	Ground
4	Fout	Frequency output
5	CO	Complementary output (LVDS/LVPECL) or NC
6	VDD	Supply voltage

9. Package details

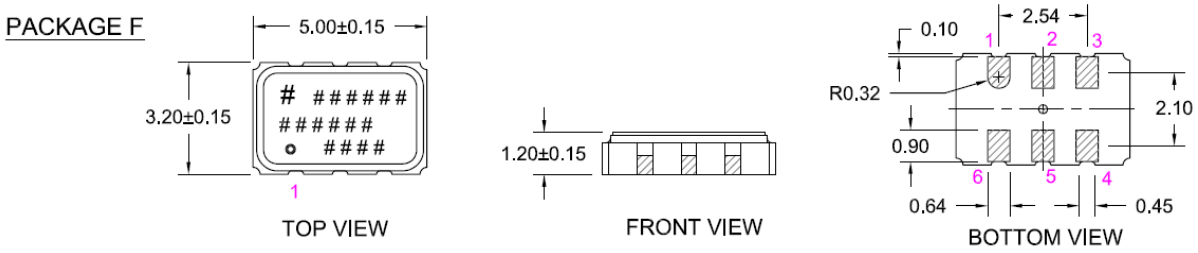
Top line : [R######] Part identifier

Middle line : [########] Part information

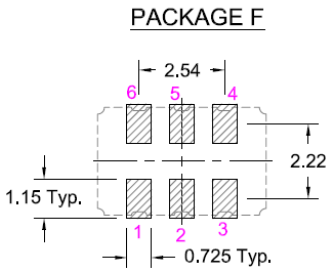
Bottom line : [o YWW] Pin 1, Year code* and week code**

* Year code: A = 2010, B = 2011, C = 2012, D= 2013, … Z = 2035

** Week code: WW = 01 = Week of first Monday of the year



Recommended PAD layout – Top view

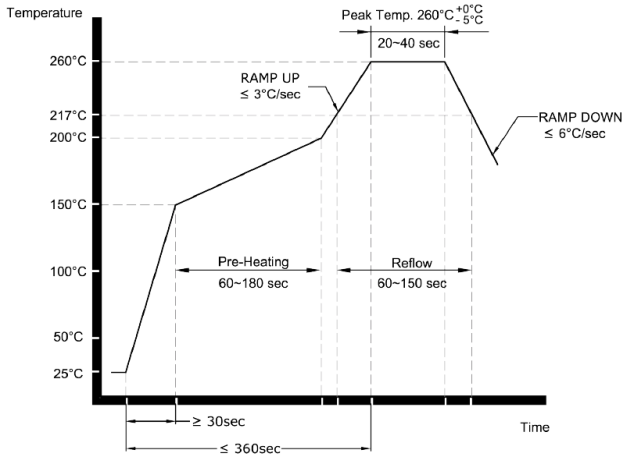


10. Manufacturing information

Packaging description:

- <300pcs: cut-tape
- > 300pcs: tape and reel.

Reflow: solder reflow process as per attached profile



Note: the product has been tested to withstand the Reflow Profile shown above. The Reflow Profile used to solder Rakon products is determined by the solder paste Manufacturer's specification. It is recommended that the Reflow Profile used does not exceed the one shown above.

11. Ordering part number

RK105 5032 CMOS-I-3-AFD-FM1-100M

Code	Product Family
RK105 5032	Rad-Tolerant 5x3.2 **XO**

Code	output waveform
CMOS	CMOS
LVDS	LVDS
PECL	LVPECL

Code	Temperature range
I	Industry (-40°C...+85°C)
M	Military (-55°C...+125°C)

Code	Supply voltage
2	2.5V
3	3.3V

Code	Frequency stability type
FVT	Frequency stability over Temp. range
AFD	Absolute Frequency Drift

Code	Radiation tolerance/Screening option
EM	- / No screening
FM0	Rad-Tolerant / No screening
FM1	Rad-Tolerant / MIL-STD105E
FM2	Rad-Tolerant/ 100%

Frequency	Fout