Field Programmable Oscillator

Features

- Support for 8 MEMS oscillator families
  - Low power (SiT1602, SiT8008, SiT8009)
  - Ultra-performance (SiT8208, SiT8209)
  - Ultra-performance differential (SiT9120, SiT9121, SiT9122)
  - High temp (SiT1618, SiT8918, SiT8919, SiT8920, SiT8921)
  - AEC-Q100 Automotive (SiT2024, SiT2025, SiT8924, SiT8925)
  - Clock Generators (SiT2001, SiT2002, SiT2018, SiT2019, SiT2020, SiT2021)
  - VCXO (SiT3807, SiT3808, SiT3809)
  - Differential VCXO (SiT3821, SiT3822)
  - Spread spectrum (SiT9001, SiT9003)
  - Differential spread spectrum (SiT9002)
- Wide variety of programmable options
  - Frequency from 1 – 625 MHz
  - Frequency stability from ±20 to ±50 ppm
  - Supply voltages of 1.8V or 2.5 to 3.3V
  - Operating temperature up to 125 °C and down to -55°C
  - Package sizes for 2.0 x 1.6 mmxmm to 7.0 x 5.0 mmxmm
  - Pull ranges from ±25 to ±1600 ppm (VCXO only)
  - Spread percentage from ±0.25% to ±2% or -0.5% to -4% (Spread spectrum only)
  - Rise/fall time from 0.25 ns to 40 ns
- Pb-free, RoHS and REACH compliant

Applications

- Generic samples in seconds for prototype builds
- Experiment with different options for optimal timing margin
- Configure different drive strengths for best EMI and/or to drive larger loads
- Fast prototype builds

Description

SiTime offers a wide range of field programmable (FP) MEMS oscillators including simple oscillators, differential oscillators, high temperature oscillators, VCXO and spread spectrum oscillators. These FP devices support the same specifications and performance as their factory-programmed counterparts.

They enable engineers to experiment with different configurations and generate customized samples in seconds for fast prototyping.

Figure 1 illustrates the simple programming setup required for programming SiTime FP devices by using the SiT6100DK, a field programming kit. Refer to SiT6100DK quick start guide and other documents for more information http://www.sitime.com/time-machine.

For production volume, SiTime offers factory programming of its entire portfolio with the shortest lead time available in the industry.

Figure 1. Field Programmable Software and Hardware

Field Programmable Device Ordering Information

A FP device works as a superset of its programmed counterpart. In certain cases, it can also be mapped to different programmed base products.

As an example, SiT8008AI-71-XXX-000.FP0000 is a field programmable device in the low power family. It comes in the 2.1 x 1.6 mm x mm package, and can be programmed to support different combinations of the following:

- Frequency: 1 MHz to 110 MHz with 6 decimal places of accuracy
- Frequency stability: ±20 ppm, ±25 ppm, ±50 ppm
- Temperature range: -20°C to 70°C, -40°C to 85°C
- Supply voltages: 1.8V or 2.5V to 3.3V
- Output drive strength: 8 different options for different rise/fall time

In addition, the SiT8008AI-11--XXX-000.FP0000 can be used for either SiT1602 or SiT8008 in the 2.0 x 1.6 mm x mm package. The SiT1602 and the SiT8008 share similar electrical specs and the same field programmable devices, but they support different frequencies.

Below is a complete summary of all currently available field programmable devices, the mapping to the programmed devices and the supported programmable options.

Contact SiTime for devices of your interest that are not covered here.

Table 1. Field Programmable Devices - MEMS XO[1]

Oscillator Product Family	Field Programmable (FP) Part Number	Supported Devices	Signaling Type	Frequency Range (MHz)	Frequency Stability (ppm)	Temp Range (°C)	Voltage (V)	Package Size (mm x mm)
Low Power Single-Ended Oscillator	SiT8008BI-71-XXX-000.FP0000	SiT1602 SiT8008	LVCMOS	1 to 110	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.0 x 1.6
	SiT8008BI-11-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8008BI-21-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8008BI-31-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8008BI-81-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	7.0 x 5.0
	SiT8009BI-71-XXX-000.FP0000	SiT8009	LVCMOS	115 to 137	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.0 x 1.6
	SiT8009BI-11-XXX-000.FP0000		LVCMOS	115 to 137	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8009BI-21-XXX-000.FP0000		LVCMOS	115 to 137	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8009BI-31-XXX-000.FP0000		LVCMOS	115 to 137	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8009BI-81-XXX-000.FP0000		LVCMOS	115 to 137	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	7.0 x 5.0
Ultra-Performance Single-Ended Oscillator	SiT8208AI-G1-XXX-000.FP0000	SiT8208	LVCMOS	1 to 80	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8208AI-21-XXX-000.FP0000		LVCMOS	1 to 80	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8208AI-31-XXX-000.FP0000		LVCMOS	1 to 80	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8208AI-81-XXX-000.FP0000		LVCMOS	1 to 80	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	7.0 x 5.0
	SiT8209AI-G1-XXX-000.FP0000	SiT8209	LVCMOS	80 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8209AI-21-XXX-000.FP0000		LVCMOS	80 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8209AI-31-XXX-000.FP0000		LVCMOS	80 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8209AI-81-XXX-000.FP0000		LVCMOS	80 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	7.0 x 5.0
High Performance Differential Oscillator	SiT9121AI-1B1-XXX000.FP0000	SiT9120, SiT9121	LVPECL	1 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	3.2 x 2.5
	SiT9121AI-1C1-XXX000.FP0000		LVPECL	1 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	5.0 x 3.2
	SiT9121AI-1D1-XXX000.FP0000		LVPECL	1 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	7.0 x 5.0
	SiT9121AI-2B1-XXX000.FP0000		LVDS	1 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	3.2 x 2.5
	SiT9121AI-2C1-XXX000.FP0000		LVDS	1 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	5.0 x 3.2
	SiT9121AI-2D1-XXX000.FP0000		LVDS	1 to 220	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	7.0 x 5.0
	SiT9122AI-1B1-XXX000.FP0000	SiT9122	LVPECL	220 to 625	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	3.2 x 2.5
	SiT9122AI-1C1-XXX000.FP0000		LVPECL	220 to 625	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	5.0 x 3.2
	SiT9122AI-1D1-XXX000.FP0000		LVPECL	220 to 625	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	7.0 x 5.0
	SiT9122AI-2B1-XXX000.FP0000		LVDS	220 to 625	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	3.2 x 2.5
	SiT9122AI-2C1-XXX000.FP0000		LVDS	220 to 625	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	5.0 x 3.2
	SiT9122AI-2D1-XXX000.FP0000		LVDS	220 to 625	±20, ±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	7.0 x 5.0

Table 1. Field Programmable Devices - MEMS XO[1] (continued)

Oscillator Product Family	Field Programmable (FP) Part Number	Supported Devices	Signaling Type	Frequency Range (MHz)	Frequency Stability (ppm)	Temp Range (°C)	Voltage (V)	Package Size (mm x mm)
High Temperature Single-Ended Oscillator	SiT8920BM-71-XXX-000.FP0000	SiT1618, SiT8918, SiT8920	LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.0 x 1.6
	SiT8920BM-11-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8920BM-21-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8920BM-31-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8920BM-81-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	7.0 x 5.0
	SiT8921BM-71-XXX-000.FP0000	SiT8919, SiT8921	LVCMOS	115.194001 or 119.342001 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.0 x 1.6
	SiT8921BM-11-XXX-000.FP0000		LVCMOS	115.194001 or 119.342001 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8921BM-21-XXX-000.FP0000		LVCMOS	115.194001 or 119.342001 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8921BM-31-XXX-000.FP0000		LVCMOS	115.194001 or 119.342001 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8921BM-81-XXX-000.FP0000		LVCMOS	115.194001 or 119.342001 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	7.0 x 5.0
AEC-Q100 Automotive Oscillator	SiT2024BM-S1-XXX-000.FP0000	SiT2024	LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.9 x 2.8
	SiT2025BM-S1-XXX-000.FP0000	SiT2025	LVCMOS	115.20 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.9 x 2.8
	SiT8924BM-71-XXX-000.FP0000	SiT8924	LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.0 x 1.6
	SiT8924BM-11-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8924BM-21-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8924BM-31-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8924BM-81-XXX-000.FP0000		LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	7.0 x 5.0
	SiT8925BM-71-XXX-000.FP0000	SiT8925	LVCMOS	115.20 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.0 x 1.6
	SiT8925BM-11-XXX-000.FP0000		LVCMOS	115.20 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.5 x 2.0
	SiT8925BM-21-XXX-000.FP0000		LVCMOS	115.20 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	3.2 x 2.5
	SiT8925BM-31-XXX-000.FP0000		LVCMOS	115.20 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	5.0 x 3.2
	SiT8925BM-81-XXX-000.FP0000		LVCMOS	115.20 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	7.0 x 5.0
Clock Generator Oscillator	SiT2001BI-S1-XXX-000.FP0000	SiT2001	LVCMOS	1 to 110	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.9 x 2.8
	SiT2002BI-S1-XXX-000.FP0000	SiT2002	LVCMOS	115 to 137	±20, ±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	2.9 x 2.8
	SiT2020BM-S1-XXX-000.FP0000	SiT2018, SiT2020	LVCMOS	1 to 110	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.9 x 2.8
	SiT2021BM-S1-XXX-000.FP0000	SiT2019, SiT2021	LVCMOS	115.194001 or 119.342001 to 137	±20, ±25, ±30, ±50	-40 to 105, -40 to 125, -55 to 125	1.8V, 2.5-3.3V	2.9 x 2.8

Note:

1. Revision number which is placed right after SiTXXXX in the part number is fixed and not programmable. For instance, SiT8008A cannot be programed to SiT8008B.

Table 2. Field Programmable Devices - MEMS VCXO[2]

Oscillator Product Family	Field Programmable (FP) Part Number	Supported Devices	Signaling Type	Frequency Range (MHz)	Frequency Stability (ppm)	Temp Range (°C)	Voltage (V)	Pull Range (ppm)	Package Size (mm x mm)
High Performance Single-Ended VCXO	SiT3808AI-G2-XXXX-000.FP0000	SiT3807, SiT3808	LVCMOS	1 to 80	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	2.5 x 2.0
	SiT3808AI-22-XXXX-000.FP0000		LVCMOS	1 to 80	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	3.2 x 2.5
	SiT3808AI-32-XXXX-000.FP0000		LVCMOS	1 to 80	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	5.0 x 3.2
	SiT3808AI-82-XXXX-000.FP0000		LVCMOS	1 to 80	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	7.0 x 5.0
	SiT3809AI-G2-XXXX-000.FP0000	SiT3809	LVCMOS	80 to 220	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	2.5 x 2.0
	SiT3809AI-22-XXXX-000.FP0000		LVCMOS	80 to 220	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	3.2 x 2.5
	SiT3809AI-32-XXXX-000.FP0000		LVCMOS	80 to 220	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	5.0 x 3.2
	SiT3809AI-82-XXXX-000.FP0000		LVCMOS	80 to 220	±25, ±50	-40 to 85, -20 to 70	1.8V, 2.5-3.3V	±25 to ±1600	7.0 x 5.0
High Performance Differential VCXO	SiT3821AI-1C2-XXXX000.FP0000	SiT3821	LVPECL	1 to 220	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	5.0 x 3.2
	SiT3821AI-1D2-XXXX000.FP0000		LVPECL	1 to 220	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	7.0 x 5.0
	SiT3821AI-2C2-XXXX000.FP0000		LVDS	1 to 220	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	5.0 x 3.2
	SiT3821AI-2D2-XXXX000.FP0000		LVDS	1 to 220	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	7.0 x 5.0
	SiT3822AI-1C2-XXXX000.FP0000	SiT3822	LVPECL	220 to 625	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	5.0 x 3.2
	SiT3822AI-1D2-XXXX000.FP0000		LVPECL	220 to 625	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	7.0 x 5.0
	SiT3822AI-2C2-XXXX000.FP0000		LVDS	220 to 625	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	5.0 x 3.2
	SiT3822AI-2D2-XXXX000.FP0000		LVDS	220 to 625	±25, ±50	-40 to 85, -20 to 70	2.5V, 3.3V	±25 to ±1600	7.0 x 5.0

Note:

2. Revision number which is placed right after SiTXXXX in the part number is fixed and not programmable. For instance, SiT8008A cannot be programed to SiT8008B.

Table 3. Field Programmable Devices - MEMS Spread Spectrum XO[3]

Oscillator Product Family	Field Programmable (FP) Part Number	Supported Devices	Signaling Type	Frequency Range (MHz)	Frequency Stability (ppm)	Temp Range (°C)	Voltage (V)	Spread Percentage	Package Size (mm x mm)
Spread Spectrum Single-Ended Oscillator	SiT9001AI-13-XXXX-000.FP000	SiT9001	LVCMOS	1 to 200	±50, ±100	-40 to 85, -20 to 70	1.8V, 2.5V, 3.3V	±0.25% to ±1% -0.5% to -2%	2.5 x 2.0
	SiT9001AI-23-XXXX-000.FP000		LVCMOS	1 to 200	±50, ±100	-40 to 85, -20 to 70	1.8V, 2.5V, 3.3V		3.2 x 2.5
	SiT9001AI-33-XXXX-000.FP000		LVCMOS	1 to 200	±50, ±100	-40 to 85, -20 to 70	1.8V, 2.5V, 3.3V		5.0 x 3.2
	SiT9001AI-83-XXXX-000.FP000		LVCMOS	1 to 200	±50, ±100	-40 to 85, -20 to 70	1.8V, 2.5V, 3.3V		7.0 x 5.0
	SiT9003AI-13-33XX-000.FP000	SiT9003	LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	2.5V, 2.8V, 3.3V	±0.25% to ±0.5% -0.5% to -1%	2.5 x 2.0
	SiT9003AI-23-33XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	2.5V, 2.8V, 3.3V		3.2 x 2.5
	SiT9003AI-33-33XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	2.5V, 2.8V, 3.3V		5.0 x 3.2
	SiT9003AI-83-33XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	2.5V, 2.8V, 3.3V		7.0 x 5.0
	SiT9003AI-13-18XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	1.8V		2.5 x 2.0
	SiT9003AI-23-18XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	1.8V		3.2 x 2.5
	SiT9003AI-33-18XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	1.8V		5.0 x 3.2
	SiT9003AI-83-18XX-000.FP000		LVCMOS	1 to 110	±50, ±100	-40 to 85, -20 to 70	1.8V		7.0 x 5.0
Spread Spectrum Differential Oscillator	SiT9002AI-X32XXXXX000.FP000	SiT9002	LVPECL LVDS HCSL CML	1 to 220	-20 to 70: ±25, ±50 -40 to 85: ±50	-40 to 85, -20 to 70	1.8V, 2.5V, 3.3V	±0.25% to ±2% -0.5% to -4%	5.0 x 3.2
	SiT9002AI-X82XXXXX000.FP000		LVPECL LVDS HCSL CML	1 to 220	-20 to 70: ±25, ±50 -40 to 85: ±50	-40 to 85, -20 to 70	1.8V, 2.5V, 3.3V		7.0 x 5.0

Note:

3. Revision number which is placed right after SiTXXXX in the part number is fixed and not programmable. For instance, SiT8008A cannot be programed to SiT8008B.

Tape & Reel Options

FP devices are shipped with standard Tape & Reel options. An additional letter is affixed to the end of the FP device part numbers in Tables 1 to 3 to specify the tape size and the reel quantity.

For example, the last letter “”G in the SiT8008AI-71-XXX-000.FP0000G indicates 250 pieces of SiT8008AI FP devices shipped in 8 mm tape.

The complete list of T&R options for different device package sizes are shown in the table below.

Table 4. Ordering Codes for Supported Tape & Reel Packing Method

Supported FP Device: SiT8008, SiT8009, SiT8920, SiT8921, SiT8924, SiT8925

Tape & Reel	8 mm Tape		12 mm Tape		16 mm Tape	
Package Size	250 pcs reel	1ku reel	250 pcs reel	1ku reel	250 pcs reel	1ku reel
2.0 x 1.6 mmxmm	G	E	–	–	–	–
2.5 x 2.0 mmxmm	G	E	–	–	–	–
3.2 x 2.5 mmxmm	G	E	–	–	–	–
5.0 x 3.2 mmxmm	–	–	X	Y	–	–
7.0 x 5.0 mmxmm	–	–	–	–	X	Y

Table 5. Ordering Codes for Supported Tape & Reel Packing Method

Supported FP Device: SiT3808, SiT3809, SiT3821, SiT3822, SiT8208, SiT8209, SiT9001, SiT9002, SiT9003, SiT9121, SiT9122

Tape & Reel	12 mm Tape		16 mm Tape	
Package Size	250 pcs reel	1ku reel	250 pcs reel	1ku reel
2.5 x 2.0 mmxmm	X	Y	–	–
3.2 x 2.5 mmxmm	X	Y	–	–
5.0 x 3.2 mmxmm	X	Y	–	–
7.0 x 5.0 mmxmm	–	–	X	Y

Table 6. Ordering Codes for Supported Tape & Reel Packing Method

Supported FP Device: SiT2024, SiT2025, SiT9021, SiT2001, SiT2002, SiT2020 SiT2021

Tape & Reel	8mm Tape	
Package Size	250 pcs reel	1ku reel
2.9 x 2.8 mmxmm	G	E

Time Machine II Programmer Kit

FP devices are programmed with SiTime's oscillator programmer. Time Machine II is a complete programming kit. It comes with the programmer base unit and three socket cards, each of which accommodates two different oscillator package sizes. The ordering codes for the programming kit and the socket cards are shown in the table below.

Note that earlier versions of the programming kit was shipped with the SiT6162DK socket card that accommodates 2.7 x 2.4 mmxmm (2.5 x 2.0 compatible) and 3.2 x 2.5 mmxmm 4-pin packages. The SiT6162DK has since been replaced with SiT6165DK, which supports the 2.9 x 2.8 mmxmm (SOT23-5) packages in addition to 3.2 x 2.5 mmxmm packages.

Table 7. Programmer Kit Description and Ordering Codes

Device Name	Part Number	Description
Programming Kit	SiT6100DK	The complete kit that includes the programmer base (SiT61650DK) and three socket cards (SiT6160DK, SiT6161 and SiT6165).
Programmer Base	SiT6150DK	The base programmer with no sockets.
Programming Socket	SiT6160DK	5.0x3.2 and 7.0x5.0 packages programming sockets to program all 6-in and 4-pin field programmable devices.
Programming Socket	SiT6161DK	2.0x1.6 and 2.5x2.0 packages programming sockets to program all 6-in and 4-pin field programmable devices.
Programming Socket	SiT6165DK	3.2x2.5 package programming sockets to program all 6-in and 4-pin field programmable devices. 2.9x2.8 (SOT23-5) package supports 5-pin field programmable devices

Socket Card Selection for Programming

Each socket card for the Time Machine II programmer comes with two sockets, each of which accommodates a particular package size. In addition, some sockets are designed to work with 4-pin devices only whereas other sockets can accommodate both 4-pin and 6-pin devices.

Table below shows how to select the proper socket card for the desired FP device package size. Note that the package sizes are also printed right next to the sockets on the socket cards for visual identification during device programming.

Table 8. Supported Packages

Package Size	2.0 x 1.6 (4-pin)	2.5 x 2.0 (4-pin)	2.9 x 2.8 (5-pin)	3.2 x 2.5 (4-pin & 6-pin)	5.0 x 3.2 (4-pin & 6-pin)	7.0 x 5.0 (4-pin & 6-pin)
Socket to use	**SiT6161DK**		**SiT6165DK**		**SiT6160DK**	
Supported Field Programmable Devices	SiT8008 SiT8009 SiT8920 SiT8921 SiT8924 SiT8925	SiT8008 SiT8009 SiT8920 SiT8921 SiT8924 SiT8925 SiT9001 SiT9003	SiT2024 SiT2025 SiT9201 SiT2001 SiT2002 SiT2020 SiT2021	SiT8008 SiT8009 SiT8208 SiT8209 SiT8920 SiT8921 SiT8924 SiT8925 SiT3808 SiT3809 SiT9121 SiT9122 SiT9001 SiT9003	SiT8008 SiT8009 SiT8208 SiT8209 SiT8920 SiT8921 SiT8924 SiT8925 SiT3808 SiT3809 SiT9121 SiT9122 SiT3821 SiT3822 SiT9001 SiT9002 SiT9003	SiT8008 SiT8009 SiT8208 SiT8209 SiT8920 SiT8921 SiT8924 SiT8925 SiT3808 SiT3809 SiT9121 SiT9122 SiT3821 SiT3822 SiT9001 SiT9002 SiT9003

Revision History

Table 9. Datasheet Version and Change Log

Revision	Release Date	Change Summary
0.8	4/1/13	First release
1.0	2/27/14	• Added more field programmer devices • Updated Time Machine Socket Card information • Formatted enhancement
1.01	3/12/14	• Corrected the ordering code for High Temperature, Single-Ended devices
1.1	3/30/15	• Updated revision from A to B for SiT8008/8009/8920/8921 • Corrected frequency stability of SiT9002
1.2	7/21/15	• Added supports for AEC-Q100 automotive products;SiT2024, SiT2025, SiT8924,SiT8925 • Added supports for clock generators products;SiT9201, 2001, 2002, SiT2018, SiT2019, SiT2020, SiT2021 • Corrected frequency range and frequency stability of the high temperature products (SiT8920/SiT8921) in Table.1 • Updated the part number of the program kits in Table.6
1.3	9/15/15	• Added ±25 ppm frequency stability option to AEC-Q100 family • Revised spread percentage of SiT9001 • Added 2.8 V voltage option to SiT9003
1.4	3/14/16	• Corrected and added one more “0” at the end of all part numbers except for SiT900x”

Silicon MEMS Outperforms Quartz

Best Reliability

Silicon is inherently more reliable than quartz. Unlike quartz suppliers, SiTime has in-house MEMS and analog CMOS expertise, which allows SiTime to develop the most reliable products. Figure 1 shows a comparison with quartz technology.

Why is EpiSeal™ MEMS Best in Class:

- SiTime's MEMS resonators are vacuum sealed using an advanced EpiSeal™ process, which eliminates foreign particles and improves long term aging and reliability
- World-class MEMS and CMOS design expertise

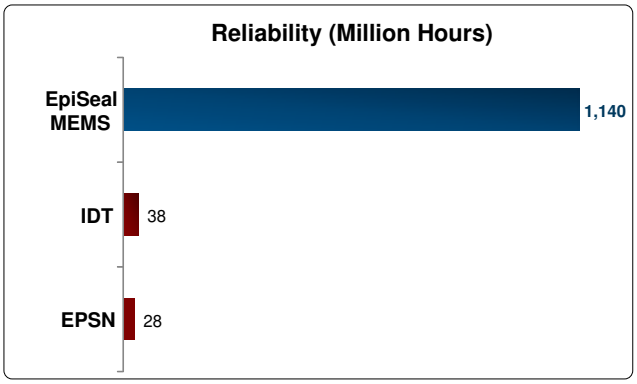

Figure 1. Reliability Comparison[1]

Best Aging

Unlike quartz, MEMS oscillators have excellent long term aging performance which is why every new SiTime product specifies 10-year aging. A comparison is shown in Figure 2.

Why is EpiSeal MEMS Best in Class:

- SiTime's MEMS resonators are vacuum sealed using an advanced EpiSeal process, which eliminates foreign particles and improves long term aging and reliability
- Inherently better immunity of electrostatically driven MEMS resonator

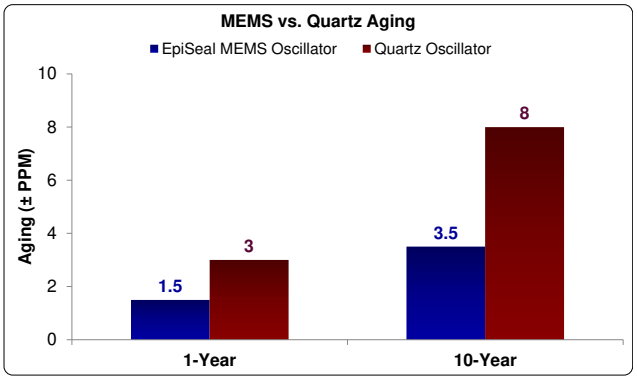

Figure 2. Aging Comparison[2]

Best Electro Magnetic Susceptibility (EMS)

SiTime's oscillators in plastic packages are up to 54 times more immune to external electromagnetic fields than quartz oscillators as shown in Figure 3.

Why is EpiSeal MEMS Best in Class:

- Internal differential architecture for best common mode noise rejection
- Electrostatically driven MEMS resonator is more immune to EMS

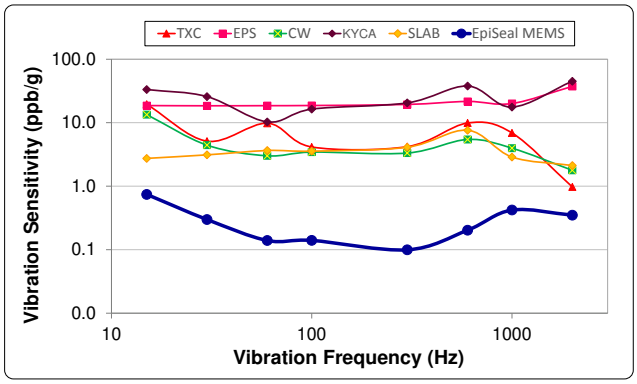

Figure 3. Electro Magnetic Susceptibility (EMS)[3]

Best Power Supply Noise Rejection

SiTime's MEMS oscillators are more resilient against noise on the power supply. A comparison is shown in Figure 4.

Why is EpiSeal MEMS Best in Class:

- On-chip regulators and internal differential architecture for common mode noise rejection
- MEMS resonator is paired with advanced analog CMOS IC

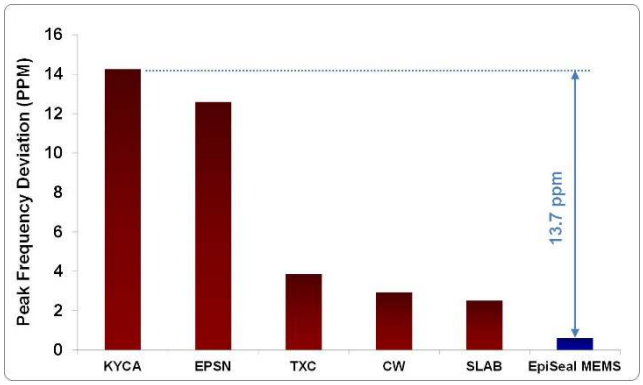

Figure 4. Power Supply Noise Rejection[4]

Best Vibration Robustness

High-vibration environments are all around us. All electronics, from handheld devices to enterprise servers and storage systems are subject to vibration. Figure 5 shows a comparison of vibration robustness.

Why is EpiSeal MEMS Best in Class:

- The moving mass of SiTime's MEMS resonators is up to 3000 times smaller than quartz
- Center-anchored MEMS resonator is the most robust design

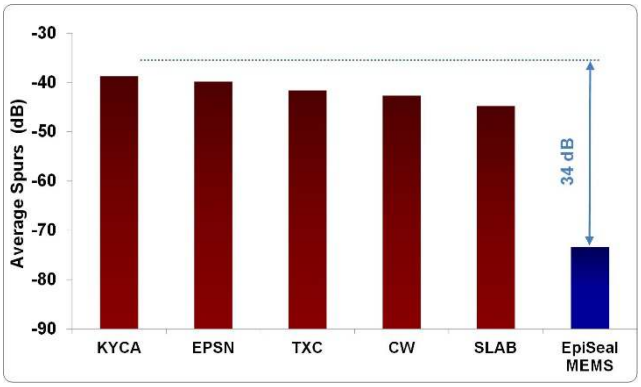

Figure 5. Vibration Robustness[5]

Best Shock Robustness

SiTime's oscillators can withstand at least 50,000 *g* shock. They all maintain their electrical performance in operation during shock events. A comparison with quartz devices is shown in Figure 6.

Why is EpiSeal MEMS Best in Class:

- The moving mass of SiTime's MEMS resonators is up to 3000 times smaller than quartz
- Center-anchored MEMS resonator is the most robust design

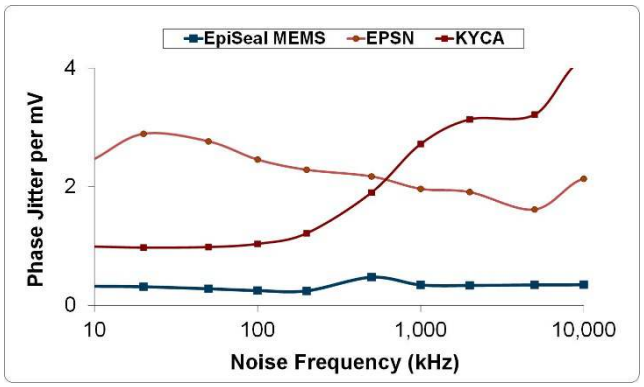

Figure 6. Shock Robustness[6]

Figure labels:

TXC = TXC
Epson = EPSN
Connor Winfield = CW
Kyocera = KYCA
SiLabs = SLAB
SiTime = EpiSeal MEMS

Notes:

1. Data source: Reliability documents of named companies.
2. Data source: SiTime and quartz oscillator devices datasheets.
3. Test conditions for Electro Magnetic Susceptibility (EMS):
   - According to IEC EN61000-4.3 (Electromagnetic compatibility standard)
   - Field strength: 3V/m
   - Radiated signal modulation: AM 1 kHz at 80% depth
   - Carrier frequency scan: 80 MHz – 1 GHz in 1% steps
   - Antenna polarization: Vertical
   - DUT position: Center aligned to antenna

   Devices used in this test:

Label	Manufacturer	Part Number	Technology
EpiSeal MEMS	SiTime	SiT9120AC-1D2-33E156.250000	MEMS + PLL
EPSN	Epson	EG-2102CA156.2500M-PHPAL3	Quartz, SAW
TXC	TXC	BB-156.250MBE-T	Quartz, 3rd Overtone
CW	Conner Winfield	P123-156.25M	Quartz, 3rd Overtone
KYCA	AVX Kyocera	KC7050T156.250P30E00	Quartz, SAW
SLAB	SiLab	590AB-BDG	Quartz, 3rd Overtone + PLL

4. **50 mV pk-pk Sinusoidal voltage.**

   Devices used in this test:

Label	Manufacturer	Part Number	Technology
EpiSeal MEMS	SiTime	SiT8208AI-33-33E-25.000000	MEMS + PLL
NDK	NDK	NZ2523SB-25.6M	Quartz
KYCA	AVX Kyocera	KC2016B25M0C1GE00	Quartz
EPSN	Epson	SG-310SCF-25M0-MB3	Quartz

5. Devices used in this test:
   same as EMS test stated in Note 3.
6. Test conditions for shock test:
   - MIL-STD-883F Method 2002
   - Condition A: half sine wave shock pulse, 500-g, 1ms
   - Continuous frequency measurement in 100 µs gate time for 10 seconds

   Devices used in this test:
   same as EMS test stated in Note 3.
7. Additional data, including setup and detailed results, is available upon request to qualified customer.

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