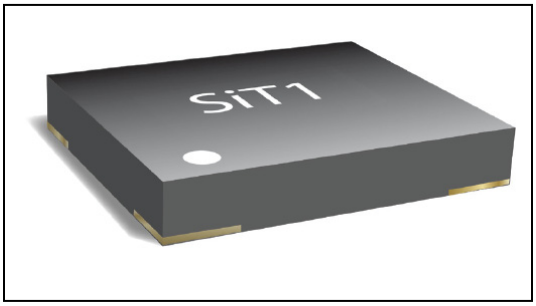
SiTime™
It's About Time

SiRes™ Fixed Frequency Oscillator

SiT1

SiT1101 to SiT1273



SiRes Oscillators are suitable for:

- Audio/Video
- Office Automation
- Automotive applications
- Industrial applications

These highly reliable oscillators are completely Quartz free.

RoHS COMPLIANT Pb FREE

Features

Standard Oscillator (resonator + drive circuit = oscillator) features

- 173 frequencies available from 1.000 MHz to 125.000 MHz
- Compare to quartz oscillators and resonators in industry standard footprints
- +/- 50 ppm, +/-100 ppm options
- 20 ps rms jitter, +/- 100 ps peak to peak jitter at 100 MHz
- Out put enable or Standby option pin.

Experience MEMS Benefits as compared to competitive quartz products

- No load capacitors or shunt resistors required for operation
- Always in stock, MEMS resonators are manufacturing in 3 weeks in lot sizes of 1 million units vs. 12 weeks for quartz in lot sizes of 30K.
- Improved manufacturing performance with greater tolerance to shock, vibration, and thermal events to eliminate resonator cracking or permanent shifts in frequency.
- Ultra reliable start up
- Simplifies layout requirements with better immunity to interfering nearby PCB signals and no requirement to be near clock destination.
- Better immunity to electro-static discharge

Packaging

- Maximum 1 ppm first year aging
- Typical +/- 0.150 ppm / year aging in packaging, to 25 years.
- Standard plastic QFN-type packaging
  - 2.0mm x 2.5mm x 0.85mm
  - 3.2mm x 2.5mm x 0.85mm
  - 5.0mm x 3.2mm x 0.85mm
  - 7.0mm x 5.0mm x 0.85mm
- 1.8 V, 2.5 V or 3.3 V operation

Description

The SiRes SiT1 oscillator family is the smallest, high-performance oscillator suitable for use in clock generation for consumer, portable, industrial, automotive, and computation applications.

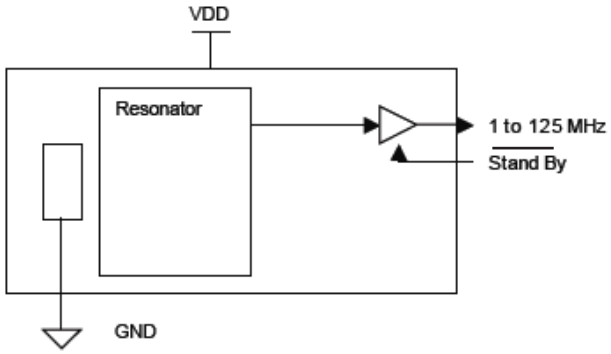
This oscillator family is packaged in standard low-cost plastic QFN-type IC packages with footprints that match common quartz surface mount products. The SiT1 oscillator family is available in 173 industry standard frequencies.

MEMS-based (mechanical structures etched onto a silicon wafer) oscillators and resonators have been the dream of many researchers due to excellent performance, reliability, and small size in the laboratory. However, frequency stability and packaging cost were barriers to commercial introduction until SiTime founders invented the EpiSeal™ and MEMS First™.

MEMS resonators are 1000x smaller by volume than quartz resonators and are built in high volume CMOS fabs instead of small custom manufacturing facilities. Due to their small size, massive lots sizes, and simpler manufacturing processes MEMS oscillators are inherently more reliable, have more consistent performance and are always in stock.

Learn more about MEMS oscillators at www.sitime.com

Block Diagram



Package Thermal Characteristics

Theta JA = 30°C/W with Copper plane on VDD and GND

Theta JA = 120°C/W with PCB traces of 0.010" to all pins

Pin Description

Pin Number	Pin Name	Pin Type	Pin Description
1	$\overline{ST}$/OE	Digital In	$\overline{Standby}$, Output Enable
2	GND	Power	Connect to Ground
3	CLK	Digital Out	Clock Output
4	VDD	Power	Connect +1.8V

External Component Selection

Series Termination Resistor

To avoid clock reflections on a 50 ohm PCB trace place a series termination resistor in series with the clock output when the PCB trace is greater than 2 inches. A 33 ohm resistor is usually sufficient. The maximum load capacitance is 15pF.

Decoupling Capacitor

A 0.1uF capacitor is recommended to be placed as close as possible to the VDD GND pins on the part. PCB traces should not be routed through vias. Only one decoupling capacitor is recommended per part.

Absolute Maximum Ratings

Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications not absolute maximum ratings.

Parameter	Min	Max	Unit
Storage Temperature	-65	150	°C
Commercial Operation Temperature "C"	0	70	°C
Industrial Operation Temperature "I"	-40	85	°C
Automotive Operation Temperature (contact SiTime or SiTime sales representative for product in this temperature range)	-40	125	°C
VDD	-0.5	+3.6	V
Electrostatic Discharge, Human Body Model		4000	V
Latch UP per JEDEC 17		200	mA
Output Short Circuit	-40	40	mA

DC Electrical Specifications

The following specification apply at 1.8V +/- 0.1V, 0 to 70 °C

Parameter	Condition	Min	Typical	Max	Unit
Operating VDD		1.7		1.98	V
Voltage Output High	25 mA load current	70% of Vdd			V
Voltage Output Low	10 mA source current			30% of Vdd	V
Operating Current Consumption	at 60 MHz, 15 pF			19	mA
Standby Current Consumption	Output is weakly pulled down		30	50	uA

The following specification apply at 3.3V +/- 0.3V, 0 to 70 °C

Parameter	Condition	Min	Typical	Max	Unit
Operating VDD		3.0		3.6	V
Voltage Output High	25 mA load current	70% of Vdd			V
Voltage Output Low	10 mA source current			30% of Vdd	V
Operating Current Consumption	at 60 MHz, 15 pF			19	mA
Power Down Current Consumption			30	50	uA

AC Electrical Specifications

The following specification apply at 3.3V +/- 0.3V, 0 to 70° C

Parameter	Condition	Min	Typical	Max	Unit
Clock Output Frequency		1		125	MHz
Frequency Drift over temperature	SiT8002Ax-x3-33S-T			+/-50	ppm
	SiT8002Ax-x4-33S-T			+/-100	ppm
Aging	1st year			1	ppm
Clock Output Duty Cycle		40	50	60	%
Clock Output Rise Time	15 pF			2	ns
Clock Output Fall Time	15 pF			2	ns
Period Jitter pk-pk	At 24 MHz		+/-200		ps
Period Jitter pk-pk	At 100 MHz		+/-100		ps
Start up time				10	ms
VDD Ramp Time		0		200	ms

SiT1xxxAC-14-33S-T

Part Family:
"SiT1"
Revision Letter:
"A" is the revision

Temperature Range
"C" -10 to 70°C
"I" -40 to 85°C

Package Size:
"1" 2.5 x 2.0 mm
"2" 3.2 x 2.5 mm
"3" 5.0 x 3.2 mm
"4" 7.0 x 5.0 mm

Frequency Tolerance:
"3" +/- 50 ppm
"4" +/- 100 ppm

Voltage Supply:
"18" 1.8V +/- 0.1V
"25" +/- 0.2V
"33" 3.3V +/- 0.3V

Pin Function:
"S" for Standby
"E" for Output Enable

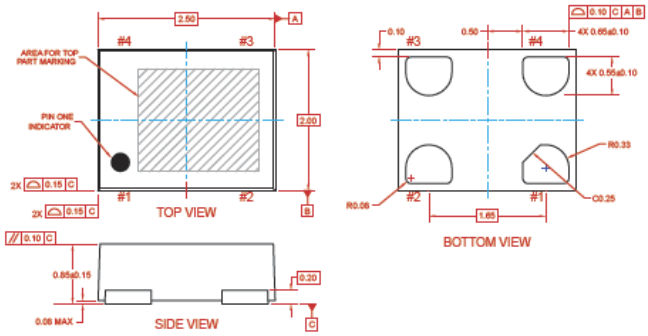
Package:
"T" for Tape & Reel

SiT1 Part Number Description

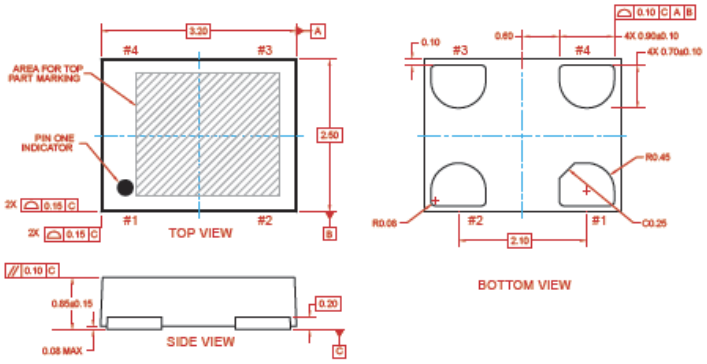
Part Number	MHz Frequency	Part Number	MHz Frequency	Part Number	MHz Frequency	Part Number	MHz Frequency	Part Number	MHz Frequency
SiT1100	1.000000	SiT1138	8.000000	SiT1176	14.318181	SiT1214	24.704000	SiT1252	44.736000
SiT1101	1.544000	SiT1139	8.000156	SiT1177	14.400000	SiT1215	25.000000	SiT1253	44.900000
SiT1102	1.843200	SiT1140	8.192000	SiT1178	14.690000	SiT1216	25.175000	SiT1254	46.608400
SiT1103	2.000000	SiT1141	8.294400	SiT1179	14.745600	SiT1217	25.576000	SiT1255	48.000000
SiT1104	2.048000	SiT1142	8.388608	SiT1180	14.850000	SiT1218	25.600000	SiT1256	49.152000
SiT1105	2.457600	SiT1143	8.432000	SiT1181	15.000000	SiT1219	26.000000	SiT1257	49.860000
SiT1106	3.072000	SiT1144	8.500000	SiT1182	15.360000	SiT1220	26.667000	SiT1258	50.000000
SiT1107	3.088000	SiT1145	9.000000	SiT1183	16.000000	SiT1221	27.000000	SiT1259	53.125000
SiT1108	3.200000	SiT1146	9.216000	SiT1184	16.000312	SiT1222	27.120000	SiT1260	54.000000
SiT1109	3.276800	SiT1147	9.545000	SiT1185	16.128000	SiT1223	28.000000	SiT1261	55.000000
SiT1110	3.579545	SiT1148	9.600000	SiT1186	16.257000	SiT1224	28.224000	SiT1262	60.000000
SiT1111	3.686400	SiT1149	9.830000	SiT1187	16.367600	SiT1225	28.322000	SiT1263	64.000000
SiT1112	3.932160	SiT1150	9.830400	SiT1188	16.384000	SiT1226	28.375000	SiT1264	65.000000
SiT1113	4.000000	SiT1151	9.843750	SiT1189	16.670000	SiT1227	28.636360	SiT1265	66.000000
SiT1114	4.032000	SiT1152	10.000000	SiT1190	16.800000	SiT1228	29.491200	SiT1266	66.666600
SiT1115	4.096000	SiT1153	10.240000	SiT1191	16.934400	SiT1229	30.000000	SiT1267	72.000000
SiT1116	4.194304	SiT1154	10.624400	SiT1192	17.280000	SiT1230	30.760000	SiT1268	75.000000
SiT1117	4.332000	SiT1155	10.738635	SiT1193	17.734475	SiT1231	31.250000	SiT1269	80.000000
SiT1118	4.433619	SiT1156	11.000000	SiT1194	18.000000	SiT1232	31.500000	SiT1270	100.000000
SiT1119	4.500000	SiT1157	11.059200	SiT1195	18.432000	SiT1233	32.000000	SiT1271	100.200000
SiT1120	4.800000	SiT1158	11.228000	SiT1196	18.869600	SiT1234	32.514000	SiT1272	106.250000
SiT1121	4.915200	SiT1159	11.289600	SiT1197	19.200000	SiT1235	32.768000	SiT1273	125.000000
SiT1122	5.000000	SiT1160	11.520000	SiT1198	19.440000	SiT1236	32.919000		
SiT1123	5.068800	SiT1161	11.981350	SiT1199	19.660800	SiT1237	33.000000		
SiT1124	5.120000	SiT1162	12.000000	SiT1200	19.680000	SiT1238	33.333300		
SiT1125	5.185000	SiT1163	12.000393	SiT1201	19.800000	SiT1239	33.868800		
SiT1126	5.500000	SiT1164	12.096000	SiT1202	20.000000	SiT1240	35.328000		
SiT1127	5.529600	SiT1165	12.288000	SiT1203	20.480000	SiT1241	36.000000		
SiT1128	5.990400	SiT1166	12.352000	SiT1204	21.477270	SiT1242	38.000000		
SiT1129	6.000000	SiT1167	12.500000	SiT1205	22.000000	SiT1243	38.400000		
SiT1130	6.144000	SiT1168	12.800000	SiT1206	22.118400	SiT1244	38.880000		
SiT1131	6.176000	SiT1169	13.000000	SiT1207	Empty	SiT1245	40.000000		
SiT1132	6.500000	SiT1170	13.225000	SiT1208	22.579200	SiT1246	40.010000		
SiT1133	6.553600	SiT1171	13.500000	SiT1209	24.000000	SiT1247	40.320000		
SiT1134	6.757000	SiT1172	13.516800	SiT1210	24.000140	SiT1248	42.000000		
SiT1135	7.200000	SiT1173	13.560000	SiT1211	24.545450	SiT1249	44.000000		
SiT1136	7.372800	SiT1174	13.824000	SiT1212	24.553500	SiT1250	44.236800		
SiT1137	7.680000	SiT1175	14.000000	SiT1213	24.576000	SiT1251	44.545000		

Package Information

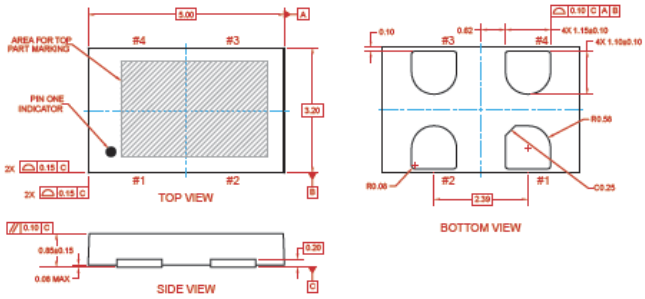
2.5 mm x 2.0 mm x 0.85 mm QFN type package



3.2 mm x 2.5 mm x 0.85 mm QFN type package



5.0 mm x 3.2 mm x 0.85 mm QFN type package



7.0 mm x 5.0 mm x 0.85 mm QFN type package