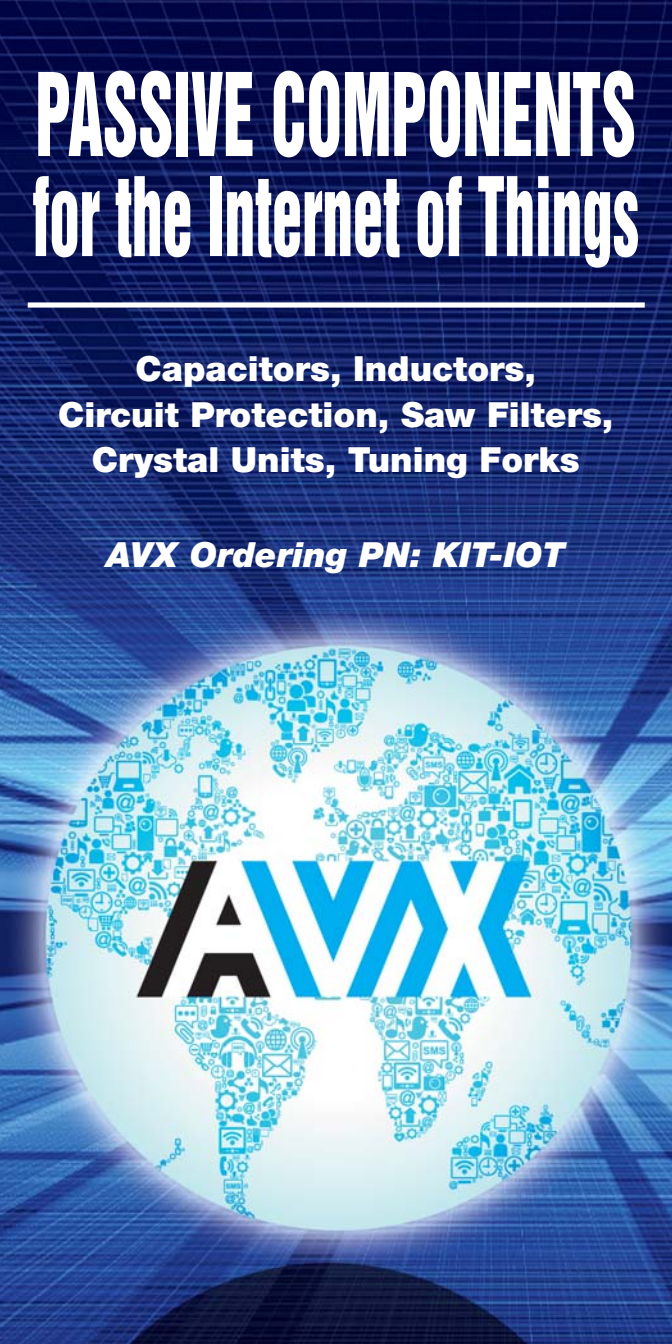
PASSIVE COMPONENTS for the Internet of Things

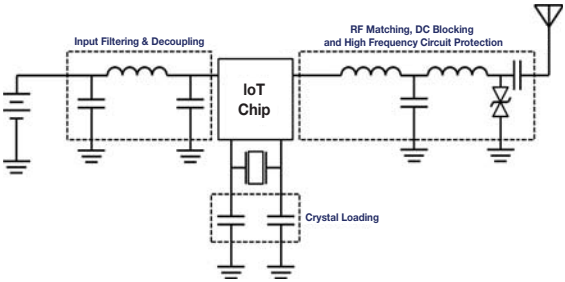
Capacitors, Inductors, Circuit Protection, Saw Filters, Crystal Units, Tuning Forks

AVX Ordering PN: KIT-IOT



Most IoT MCU chips currently require an input voltage filtering/decoupling network, a timing device network, and an output impedance matching network for the RF antenna, which usually communicates using Bluetooth LE, ZigBee, ANT, or other wireless network protocol.

AVX provides passive components suitable for use in all required networks of operation for IoT devices. The diagram below shows an example of a possible use for the components in this kit to get the most out of your IoT device.



Each of these blocks represents an example of how your IoT device might be set up, and all the passive components shown here are included in this kit.

For design suggestions, part recommendations, or other assistance, please contact your local AVX sales office, visit us at www.avx.com, or call us at (864) 967-2150.

IN THIS DESIGN KIT...

For more detailed part information please email us at inquiry@avx.com

RF MICROWAVE COMPONENTS

RF Capacitors	AVX PN	Size	Capacitance (pF)	Rated DC Voltage (V)	NOTE	
	04025U2R2BAT2A	0402	2.2 ± 0.1 pF	50 V	For tighter tolerance RF capacitors please contact AVX.	
	04025U120GAT2A	0402	12 ± 2%	50 V		
RF Inductors	AVX PN	Size	Inductance (nH)	DCR (Ω)	I_{DC} (mA)	Type
	LCMC0402B2N0GTAR	0402	2.0 ± 0.1 nH	0.06	300	Multilayer Ceramic Inductor
	LCWC0402J1N0GTAR	0402	1.0 ± 5%	0.045	1360	Wire Wound Ceramic Inductor
RF Circuit Protection	AVX PN	Size	Working DC Voltage (V)	Clamping Voltage (V)	Capacitance (pF)	Type
	VCH4AG100R8MATWA	0402	10	125	0.8	SMT Sub-pF Multilayer Varistor
SAW Filters	AVX/Kyocera PN	Size L x W x H (in)	Pass Band (MHz)	Insertion Loss (dB)	Pass Band Variation (dB)	VSWR
	SF14-0915M5UUA1 (Short range)	0.06 x 0.04 x 0.02	902 - 928	3.0 max	1.8 max	2.0 max
	SF14-1582M5UUD2X (GPS, GLONASS, COMPASS)	0.06 x 0.0 x 0.02	1574.39 - 1576.45	1.5 max	-	2.0 max
			1565.19 - 1585.65	2.0 max	-	2.0 max
			1559.05 - 1563.15	2.3 max	-	2.3 max
			1597.55 - 1605.89	2.2 max	-	2.0 max
	SF14-2446M5UUA3 (W-LAN, Bluetooth®)	0.06 x 0.04 x 0.02	2400 - 2493	2.3 max	1.4 max	2.1 max

INPUT VOLTAGE FILTERING AND DECOUPLING

Filter Capacitors	AVX PN	Size	Capacitance (µF)	Rated DC Voltage (V)	NOTE
	TCNK107M006R0200	K or 1206 Low Profile	100 ± 20%	6.3	Polymer Tantalum capacitors are moisture sensitive. Please contact AVX for Samples.
	TCJS226M006R0400		22± 20%	6.3	
	04026D106MAT2A	0402	10 ± 20%	6.3	High CV X5R MLCC
	0603ZD226MAT2A	0603	22 ± 20%	10	

Low Profile Power Inductors	AVX PN	Size L x W x H (in)	Inductance (µH)	DCR (Ω)	I_{SAT} (A)	I_{RMS} (A)
	LMLP03B3M100CTAR	0.118 x 0.118 x 0.059	10 ± 20%	0.23	0.70	0.71
	LMLP05D5M100CTAS	0.197 x 0.197 x 0.157	10 ± 20%	0.06	2.30	2.10
	LMLP06A6M100CTAR	0.236 x 0.236 x 0.047	10 ± 20%	0.24	1.00	1.00

TIMING DEVICES

Crystal Units	AVX/Kyocera PN	Size	Nominal Frequency (MHz)	Motional Series Resistance (Ω)	Load Capacitance (pF)	Drive Level (µW)
	CX2016DB16000D0WRZC1	0806	16	200 max	8.0	10 (100 max)
	CX2016DB32000D0WZRC1	0806	32	60 max	8.0	10 (100 max)
	CX2520DB32000H0WPRC1	1008	32	50 max	8.0	10 (100 max)
Tuning Forks	AVX/Kyocera PN	Size	Nominal Frequency (KHz)	Motional Series Resistance (Ω)	Load Capacitance (pF)	Shunt Capacitance (pF)
	ST3215SB32768E0HPWBB	1206	32.768	70 max	9.0 typ	0.9 typ
	ST2012SB32768E0HPWBB	0805	32.768	80 max	9.0 typ	1.3 typ
	ST2012SB32768C0HPWB4	0805	32.768	80 max	7.0 typ	1.3 typ

Capacitors for Crystal Unit Loading	AVX PN	Size	Capacitance (pF)	Rated DC Voltage (V)	NOTE
	04025U150FAT2A	0402	15 ± 1%	50	For tighter tolerance capacitors please contact AVX.
	04025U270FAT2A	0402	27 ± 1%	50	

CRYSTAL PRODUCTS
for the Internet of Things

MHz Crystal Unit, 32KHz Tuning Fork Crystal, Clock Oscillator & TCXO

Most IoT MCU / Connectivity chips currently require small and high precision crystal products, such as crystal unit, clock oscillator and TCXO. Kyocera is the only company who provides the in-house vertical supply-chain of synthetic quartz crystals, crystal units and ceramic packages. This gives us a great advantage in manufacturing cost compared with the competitors. Our emphasis is on high end crystal units that require tight frequency stability in smaller packages targeting IoT devices.

The diagram below shows the necessity of crystal units on BLE application which is required by IoT device.

CLOCK MANAGEMENT

Most of case, 2 types of crystal units are required.

For design suggestions, part recommendations, or other assistance, please contact your local AVX sales office or visit us at www.avx.com.

IOT DESIGN KIT

FOR WIRELESS APPLICATION: BLE, WIFI & GPS

MHz Crystal Unit

Series Number	Package size (mm)	Freq. Range (MHz)	Freq. Tolerance (PPM)	Freq. Stability -30 to +85C (PPM)
CX1612	1.6 x 1.2	24 - 60	±10	±15
CX2016	2.0 x 1.6	16 - 60	±10	±15
CX2520	2.5 x 2.0	12 - 54	±15	±15

32KHz Tuning Fork Crystal unit

Series Number	Package size (mm)	Freq. Tolerance (PPM)	Freq. Stability -30 to +85C (PPM)	ESR (Kohm)
ST2012SB	2.0 x 1.2	±20	±200	75
ST3215SB	3.2 x 1.5	±20	±200	70

TCXO

Series Number	Package size (mm)	Freq. Range (MHz)	Freq. Stability -30 to +85C (PPM)	Supply Voltage (V)
KT1612A	1.6 x 1.2	10 - 52	±0.5 - ±2.0	1.68 - 3.63
KT2016K	2.0 x 1.6	10 - 52	±0.5 - ±2.0	1.68 - 3.63
KT2520K	2.5 x 2.0	10 - 52	±0.5 - ±2.0	1.68 - 3.63
KT3225K	3.2 x 2.5	10 - 52	±0.5 - ±2.0	1.68 - 3.63

FOR MCU / APPLICATION PROCESSOR

MHz Crystal Unit

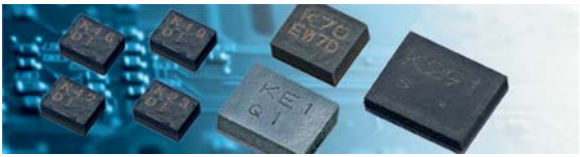
Series Number	Package size (mm)	Freq. Range (MHz)	Freq. Tolerance (PPM)	Freq. Stability -30 to +85C (PPM)
CX1612DB	1.6 x 1.2	24 - 60	±10	±15
CX2016DB	2.0 x 1.6	16 - 60	±10	±15
CX2520DB	2.5 x 2.0	12 - 54	±15	±15
CX3225SB	3.2 x 2.5	12 - 54	±15	±15

Clock Oscillator

Series Number	Package size (mm)	Freq. Range (MHz)	Freq. Stability -30 to +85C (PPM)	Supply Voltage (V)
KC2016K	1.6 x 1.2	10 - 52	±0.5 - ±2.0	1.68 - 3.63
KC2520K	2.0 x 1.6	10 - 52	±0.5 - ±2.0	1.68 - 3.63
KC3225K	2.5 x 2.0	10 - 52	±0.5 - ±2.0	1.68 - 3.63

SAW FILTERS/ SAW DUPLEXERS

AVX KYOCERA



AVX/Kyocera supplies various types of surface mount SAW (Surface Acoustic Wave) filters based on unique simulation and fine processing technologies. Our wide range of products includes RF SAW filters for various industries.

TELE COMMUNICATION

SAW Duplexer

RF SAW Filter

GPS

RF SAW Filter

WIRELESS NETWORK

RF SAW Filter
for WLAN

SAW DEVICE TECHNOLOGY

SRWI

RF SAW Filter
for SRWI

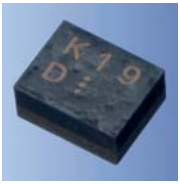
MEDICAL

RF SAW Filter
For MICS

AVX KYOCERA

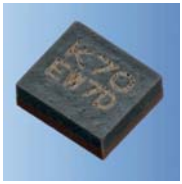
FOR WIRELESS APPLICATION: GPS, WIFI, ISM

AVX part number	Case size	Type	Center Freq
SF14-1582M5UUD2	1.4x1.1 mm	GNSS/GPS	1582MHz
SF14-2446M5UUA3	1.4x1.1 mm	2.4GHz wifi	2446MHz
SF14-0915M5UUA1	1.4x1.1 mm	ISM in US	915MHz



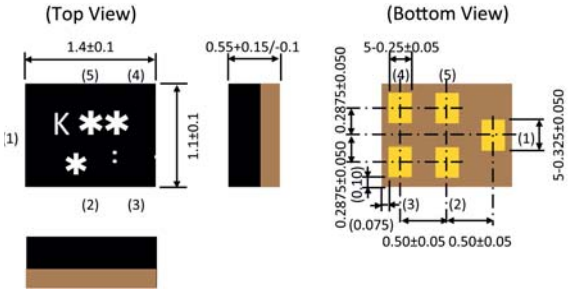
SF14-1582M5UUD2

SF14-2446M5UUA3



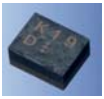
SF14-0915M5UUA1

DIMENSIONS



SF14-1582M5UUD2

AVX part number	Case size	Type	Center Freq
SF14-1582M5UUD2	1.4x1.1 mm	GNSS/GPS	1582MHz



FEATURES

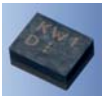
- Multi-GNSS SAW Filter
- Low Insertion Loss

SPECIFICATIONS

Items	Frequency [MHz]	Specification			Unit
		min.	typ.	max.	
Nominal Center Frequency	–		1582		MHz
Insertion Loss	1574.39 to 1576.45	–	0.9	1.5	dB
	1565.19 to 1585.65	–	1.2	2.0	dB
	1559.05 to 1563.15	–	1.2	2.3	dB
	1597.55 to 1605.89	–	1.4	2.2	dB
Group Delay Ripple	1597.55 to 1605.89	–	5.5	15	ns
Input VSWR	1574.39 to 1576.45	–	1.2	2.0	–
	1565.19 to 1585.65	–	1.7	2.0	–
	1559.05 to 1563.15	–	1.3	2.2	–
	1597.55 to 1605.89	–	1.5	2.0	–
Output VSWR	1574.39 to 1576.45	–	1.2	2.0	–
	1565.19 to 1585.65	–	1.7	2.0	–
	1559.05 to 1563.15	–	1.3	2.3	–
	1597.55 to 1605.89	–	1.6	2.0	–
Absolute Attenuation	777 to 798	40	42	–	dB
	824 to 915	40	42	–	dB
	10 to 925	40	42	–	dB
	925 to 960	40	42	–	dB
	1427 to 1463	40	45	–	dB
	1710 to 1785	35	37	–	dB
	1850 to 1910	37	39	–	dB
	1920 to 1980	39	45	–	dB
	2401 to 2483	38	42	–	dB
	2500 to 2570	35	40	–	dB
700MHz harmonic	Input : 15dBm at 787.76MHz Measure : second harmonic at 1575.52MHz	–	-77	-73	dBm

SF14-2446M5UUA3

AVX part number	Case size	Type	Center Freq
SF14-2446M5UUA3	1.4x1.1 mm	2.4GHz wifi	2446MHz



FEATURES

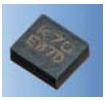
- Low Insertion Loss

SPECIFICATIONS

Items	Frequency [MHz]	Specification			Unit
		min.	typ.	max.	
Insertion Loss	2400 to 2493	–	1.5	2.3	dB
Ripple	2400 to 2493	–	0.3	1.4	dB
Input VSWR	2400 to 2493	–	1.3	2.1	–
Output VSWR	2400 to 2493	–	1.3	2.1	–
Absolute Attenuation	875 to 885	50	59	–	dB
	869 to 894	50	58	–	dB
	925 to 960	50	56	–	dB
	1477 to 1501	38	44	–	dB
	1574.42 to 1576.42	38	44	–	dB
	1805 to 1880	30	37	–	dB
	1930 to 1990	28	33	–	dB
	2110 to 2155	28	38	–	dB
	2110 to 2170	28	36	–	dB
	2595 to 2625	30	39	–	dB
	4800 to 5805	23	27	–	dB
Input Impedance		50//2.7nH			ohm
Output Impedance		50//2.7nH			ohm

SF14-1582M5UUD2

AVX part number	Case size	Type	Center Freq
SF14-0915M5UUA1	1.4x1.1 mm	ISM in US	915MHz



FEATURES

- Low Insertion Loss

SPECIFICATIONS

Items	Frequency [MHz]	Specification			Unit
		min.	typ.	max.	
Nominal Center Frequency	–		915		MHz
Insertion Loss	902 to 928	–	1.8	3.0	dB
Ripple (peak to peak)	902 to 928	–	0.5	1.8	dB
Input VSWR	902 to 928	–	1.7	2.0	–
Output VSWR	902 to 928	–	1.7	2.0	–
Absolute Attenuation	0.3 to 800	50	56	–	dB
	800 to 845	45	62	–	dB
	845 to 880	33	47	–	dB
	947 to 992	13	27	–	dB
	992 to 1020	35	53	–	dB
	1020 to 1200	45	53	–	dB

AMERICAS

AVX Greenville, SC	864-967-2150

EUROPE

AVX Limited, England	+44-1276-697000
AVX S.A.S., France	+33-1-69-18-46-00
AVX GmbH, Germany	+49-0811-95949-0
AVX SRL, Italy	+39-02-614-571
AVX Czech Republic	+420-57-57-57-521
AVX/ELCO UK	a+44-1638-675000
ELCO Europe GmbH	+49-2741-299-0
AVX S.A., Spain	+34-91-63-97-197
AVX Benelux	+31-187-489-337

ASIA-PACIFIC

AVX/Kyocera (S) Pte Ltd., Singapore	+65-6286-7555
AVX/Kyocera, Asia, Ltd., Hong Kong	+852-2363-3303
AVX/Kyocera Yuhan Hoesa, South Korea	+82-2785-6504
AVX/Kyocera HK Ltd., Taiwan	+886-2-2656-0258
AVX/Kyocera (M) Sdn Bhd, Malaysia	+60-4228-1190
AVX/Kyocera International Trading Co. Ltd., Shanghai	+86-21-3255 1933
AVX/Kyocera Asia Ltd., Shenzen	+86-755-3336-0615
AVX/Kyocera International Trading Co. Ltd., Beijing	+86-10-6588-3528
AVX/Kyocera India Liaison Office	+91-80-6450-0715

ASIA-KED

(KYOCERA Electronic Devices)

KED Hong Kong Ltd.	+852-2305-1080/1223
KED Hong Kong Ltd.Shenzen	+86-755-3398-9600
KED Company Ltd. Shanghai	+86-21-3255-1833
KED Hong Kong Ltd. Beijing	+86-10-5869-4655
KED Taiwan Ltd.	+886-2-2950-0268
KED Korea Yuhan Hoesa, South Korea	+82-2-783-3604/6126
KED (S) Pte Ltd.Singapore	+65-6509-0328
Kyocera Corporation – Japan	+81-75-604-3449

Contact:

A KYOCERA GROUP COMPANY

www.avx.com

OCEAN CHIPS
Океан Электроники
Поставка электронных компонентов

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

FORSTAR®

Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А