

CTS製品紹介



CTS[®]
ELECTRONIC COMPONENTS

2015.2.2 ver. 1.5.1

ダイトエレクトロン株式会社
電子デバイス営業部

CTS社 会社概要

- 社名 : CTS Corporation (N.Y.証券取引所 上場)
 - 社名の由来 Chicago Telephone Supply Company

- 設立 : 1896年

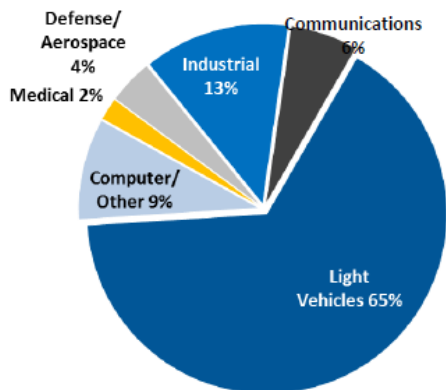
- 本社 : インディアナ州エルクハート

- 主要製品 : 自動車用パワートレインのセンサー&アクチュエータ
電子部品(クリスタル製品、フィルタ、他)

- 売上 : \$409M (2013年実績)

- 売上比率 [地域]アメリカ:53%、アジア:34%、ヨーロッパ:13%

- [市場]自動車:65%、産業機器:13%、コンピュータ関係:9%
通信:6%、防衛・航空宇宙:4%、医療:2%



CTS社取扱い製品

Electronic
Components
Solutions
Products



Standard Timing Components



Precision Timing Components



Integrated Subsystems



Ruggedized Products



Ceramic RF Filters



Waveguide Components



Timing ICs



EMI/RFI Filter Components



Variable Resistors & Encoder



Resistive/Capacitive Networks



Switches & Variable Resistors



Thermal Management Components

2011年にHigh-End水晶デバイスメーカーのValpey Fisher社を買収。
Mid-LowからHigh-Endまでの幅広い製品をラインナップ。

アプリケーション & 採用会社例

Product Categories

- Frequency Control Products
- RF Ceramic Filters
- EMI/RFI Filters
- Thermal Management Products
- Resistors Networks
- Switches & Variable Resistors

Capabilities

- ✓ Research, Design & Engineering
- ✓ Custom Packaging
- ✓ North America and Asia Footprint
- ✓ ISO 13485, 9001, 14001 Certifications

Applications



Wireless Broadband and HDD Actuation



Industrial Instrumentation



Defense and Aerospace Communication & Guidance Systems



Medical Diagnostics & Instrumentation

Customers



拠点 & 工場



水晶デバイス製品

水晶発振子

水晶発振器

TCXOs & VCXOs

OCXOs

HIGH RELIABILITY / COTS
OSCILLATORS

HIGH TEMPERATURE
OSCILLATORS

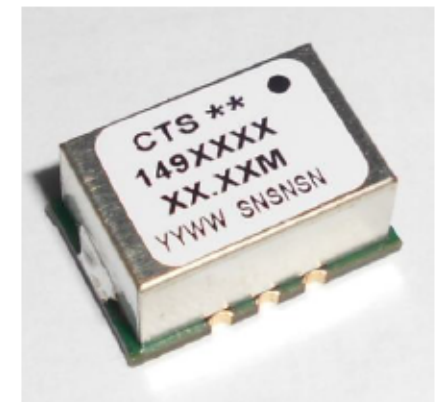
SHOCK & VIBRATION GRADE
OSCILLATORS

新製品 (2013~2014年)

MODEL 149 – MINIATURE SINGLE OVEN OCXO

Smallest OCXO with high-performance SC-cut Crystal

- **Applications:** **Wireless Small-Cell Basestations**
Precision timing application
- **Frequencies:** **10.0, 12.8, 19.2, 20.0 and 25.0 MHz**
- **Package size:** **Standard 14mm x 9mm x 11mm**
Surface Mount or Thru-Hole
- **Freq-Temp stability:** **± 50 ppb over $-40 - +85^{\circ}\text{C}$**
- **24hr Holdover:** **± 15 ppb total from all factors**
- **Phase Noise:**
10Hz @ -118 dBc/Hz
100Hz @ -130 dBc/Hz
1KHz @ -140 dBc/Hz
10KHz @ -148 dBc/Hz



水晶発振子

QUARTZ CRYSTALS



Applications

- Frequency Reference
 - FPGAs, Microcontrollers
- Wireless Communication
 - Bluetooth, ZigBee
- Networking
- RFID

Features

- Tight Stability Options
- Small Package Footprints
- Standard Distribution Products

QUARTZ CRYSTALS*	PACKAGE SIZE (mm)	FREQUENCY RANGE (MHz)	CALIBRATION TOLERANCE (ppm)	TEMPERATURE STABILITY (ppm)	
 Cost Efficient Glass Seal	Model 443	3.2 x 2.5	12 - 48	± 20	± 30
	Model 445	5.0 x 3.2	10 - 50	± 20	± 30
	Model 402 	2.0 x 1.6	16 - 60	± 20	± 30
 Cost Efficient SMT	Model 425	2.5 x 2.0	16 - 54	± 30	± 50
	Model 403	3.2 x 2.5	12 - 50	± 30	± 50
	Model 405	5.0 x 3.2	12 - 50	± 30	± 50
 SMT	Model 406	6.0 x 3.5	10 - 50	± 30	± 50
	Model 407	7.0 x 5.0	6.0 - 156.25	± 30	± 50
 HC-49US-SM	ATS-SM Series	12.3 x 4.83 x 4.3	3.2 - 64	± 30	± 50
	ATS-SMTS Series TIGHT STABILITY	12.3 x 4.83 x 4.3	3.2 - 64	± 20	± 30
	ATSSMLP Series LOW PROFILE	12.3 x 4.83 x 3.2	3.2 - 64	± 30	± 30
	ATSSMGL Series GROUND LEAD	12.3 x 5.0 x 4.3	3.2 - 64	± 30	± 30
	ATSSM4P Series 4-PAD FOOTPRINT	13.0 x 4.85 x 5.2	3.2 - 64	± 30	± 30
 HC-49US	ATS Series	10.85 x 4.5 x 3.68	3.2 - 64	± 30	± 50
 HC-49U	MP Series	10.85 x 4.5 x 13.46	1.8 - 64	± 30	± 50
	UM1 Series	7.1 x 2.4 x 8.0	3.5 - 65	± 30	± 50
	UM5 Series	7.1 x 2.4 x 6.0	10 - 100	± 30	± 50

* Available in Commercial and Industrial temperature ranges.

TUNING FORK CRYSTALS



Applications

- Real Time Reference

Features

- Legacy Platforms Available
- Small Package Footprints
- Standard Distribution Products

TUNING FORK CRYSTALS*		PACKAGE SIZE (mm)	FREQUENCY RANGE (kHz)	CALIBRATION TOLERANCE (ppm)	TEMPERATURE STABILITY (ppm)
 Cost Efficient Tuning Fork	TF32 Series	3.2 x 1.5	32.768	± 20	-0.030/°C ² Temp Coefficient
	TF20 Series	2.0 x 1.2 x 0.6	32.768	± 20	-0.030/°C ² Temp Coefficient
	TF16 Series	1.6 x 1.0	32.768	± 20	-0.030/°C ² Temp Coefficient
 Citizen CM519 Epson FC-255	TF20L Series	2.0 x 1.2 x 0.38	32.768	± 20	-0.030/°C ² Temp Coefficient
 Citizen CM519 Epson FC-255	TF519 Series	4.9 x 1.8	32.768	± 20	-0.034/°C ² Temp Coefficient
 Citizen CM200 Epson MC-306	TFPM Series	8.0 x 3.8	32.768	± 20	-0.034/°C ² Temp Coefficient
 Citizen CM310 Epson MC-146	TFPMN Series	6.9 x 1.4	32.768	± 20	-0.034/°C ² Temp Coefficient
 Citizen CFS Epson C-Type	TFNC Series	5.1 x 1.5 6.2 x 2.1 8.3 x 3.1	32.768	± 20	-0.035/°C ² Temp Coefficient

* Available in Commercial and Industrial temperature ranges.

AUTOMOTIVE CRYSTALS



Applications

- RKE [Remote Keyless Entry]
- Audio/Video Systems
- Mobile Multimedia Systems
- Wireless Communication
 - Bluetooth, ZigBee
- TPMS [Tire Pressure Monitoring System]

Features

- **AEC-Q200 Certified**
- Extended Operating Temperature, to +150°C
- Small Package Footprints

AUTOMOTIVE CRYSTALS*		PACKAGE SIZE (mm)	FREQUENCY RANGE (MHz)	CALIBRATION TOLERANCE (ppm)	TEMPERATURE STABILITY (ppm)
Coat Efficient Tuning Fork	TFA32	3.2 x 1.5	0.032768	± 20	-0.030/°C ² Temperature Coefficient
	TFA20	2.0 x 1.2	0.032768	± 20	-0.030/°C ² Temperature Coefficient
Glass Seal	GA324	3.2 x 2.5	15 - 40	± 30	± 50
	GA532	5.0 x 3.2	8 - 40	± 30	± 50
	GA534	5.0 x 3.2	8 - 40	± 30	± 50
Seam Weld	SA324	3.2 x 2.5	10 - 40	± 10	± 50
	SA534	5.0 x 3.2	8 - 40	± 10	± 50

* Compliant with AEC-Q200 Standards

CLOCK OSCILLATORS



Applications

- Frequency Reference
 - FPGAs, Microcontrollers
- Data Communications
- Test & Measurement
- Computing
- Real Time Clock
 - TC Series

Features




- Output Logic Options
- Tight Stability Options
- Low Phase Jitter

CLOCK OSCILLATORS*	PACKAGE SIZE (mm)	FREQUENCY RANGE (MHz)	TEMPERATURE STABILITY (ppm)	OUTPUT LOGIC	SUPPLY VOLTAGE (V _{CC})
 Real Time Clock	Model TC25	2.5 x 2.0	0.032768	± 20, ± 25, ± 50	HCMOS 1.5, 1.8, 2.5, 3.3
	Model TC32	3.2 x 2.5	0.032768	± 20, ± 25, ± 50	HCMOS 1.5, 1.8, 2.5, 3.3
	Model TC50	5.0 x 3.2	0.032768	± 20, ± 25, ± 50	HCMOS 1.5, 1.8, 2.5, 3.3
	Model TC70	7.0 x 5.0	0.032768	± 20, ± 25, ± 50	HCMOS 1.5, 1.8, 2.5, 3.3
 General Purpose	Model 625	2.5 x 2.0	1.0 - 50	± 25, ± 50	HCMOS/TTL 1.8, 2.5, 2.8, 3.3
	Model 632	3.2 x 2.5	1.0 - 75	± 25, ± 50	HCMOS/TTL 1.8, 2.5, 2.8, 3.3
	Model 636	5.0 x 3.2	1.0 - 125	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 1.8, 2.5, 3.3, 5.0
	CB3 CB3LV	7.0 x 5.0	1.5 - 160	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 3.3, 5.0
	CB1V8	7.0 x 5.0	1.0 - 70	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 1.8
	CB2V5	7.0 x 5.0	1.0 - 125	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 2.5
 Thru-hole	MXO45HS MXO45HST	13.2 x 13.2 x 5.5	1 - 105	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 5.0
	MXO45HSLV MXO45HSTLV	13.2 x 13.2 x 5.5	1.0 - 50	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 3.3
 Thru-hole	MXO45 MXO45T	13.2 x 20.8 x 5.1	1 - 105	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 5.0
	MXO45LV MXO45TLV	13.2 x 20.8 x 5.1	1.0 - 50	± 20, ± 25, ± 50, ± 100	HCMOS/TTL 3.3
 Model 635 High Frequency Fundamental Model 656 Analog Multiplier Model 658 Digital Multiplier	Model 635 High Frequency Fundamental	7.0 x 5.0	19.44 - 250	± 20, ± 25, ± 50, ± 100	LVPECL LVDS 2.5, 3.3
	Model 656 Analog Multiplier	7.0 x 5.0	62.5 - 670	± 25, ± 50	LVPECL LVDS HCMOS 2.5, 3.3
	Model 658 Digital Multiplier	7.0 x 5.0	38 - 750	± 20, ± 25, ± 100	LVPECL LVDS HCMOS 2.5, 3.3

* Available in Commercial and Industrial temperature ranges.

水晶発振器

CLOCK OSCILLATORS

CRYSTAL OSCILLATORS	FREQUENCY RANGE (MHz)	STABILITY (ppm)	OUTPUT TYPE	PACKAGE SIZE (mm)
 VF901274 <0.2 ps RMS Jitter	100 - 160	±50	LVPECL	 5 x 7
VFX0321	16 - 800	±20	LVC MOS LVPECL LVDS	
 VF900990 <0.1 ps RMS Jitter	156.25	±50	LVPECL	 9 x 14

TCXOs & VCXOs

TCXOs & VCXOs







Applications

- Femtocells
- Base Stations
- GPS
- Test & Measurement
- Wireless Communication
- Networking
- Digital Audio
- Phase Locked Loop

Features

- Stable Frequency Reference
- Excellent Phase Noise
- Frequency Compensation
 - Voltage Control
 - Temperature [TCXO]



TCXOs*		PACKAGE SIZE (mm)	FREQUENCY RANGE (MHz)	TEMPERATURE STABILITY (ppm)	OUTPUT LOGIC	SUPPLY VOLTAGE (V _{DC})
	Model 520	2.5 x 2.0	10 - 52	± 0.5, ± 2.5	CLIPPED SINE WAVE	1.8, 2.5, 2.8, 3.0, 3.3
	Model 525	3.2 x 2.5	10 - 40	± 0.5, ± 2.5	CLIPPED SINE WAVE	1.8, 2.5, 2.7, 2.8, 3.0, 3.3
	Model 532	5.0 x 3.2	10 - 40	± 0.5, ± 2.5	CLIPPED SINE WAVE	2.8, 3.0, 3.3, 5.0
	Model 533	5.0 x 3.2	10 - 40, 50	± 0.5, ± 2.5	HCMOS	2.8, 3.0, 3.3
	Model 585	7.0 x 5.0	10 - 40	± 0.5, ± 2.5	CLIPPED SINE WAVE	2.8, 3.0, 3.3, 5.0
	Model 586	7.0 x 5.0	10 - 40	± 0.5, ± 2.5	HCMOS	2.8, 3.0, 3.3, 5.0
	Model 578 Stratum 3	7.0 x 5.0	5 - 40	± 0.28 (± 4.6 overall)	CLIPPED SINE WAVE	3.3, 5.0
	Model 579 Stratum 3	7.0 x 5.0	5 - 40	± 0.28 (± 4.6 overall)	HCMOS	3.3, 5.0



VCXOs *		PACKAGE SIZE (mm)	FREQUENCY RANGE (MHz)	APR PULL RANGE (ppm)	OUTPUT LOGIC	SUPPLY VOLTAGE (V _{DC})
	Model 357 Low Phase Noise	7.0 x 5.0	1.5 - 77.76	±50 [std]	HCMOS/TTL	3.3, 5.0
	Model 335 High Frequency Fundamental	7.0 x 5.0	19.44 - 212.5	±50 [std]	LVPECL LVDS	2.5, 3.3
	Model 356 Analog Multiplier	7.0 x 5.0	100 - 670	±50 [std]	LVPECL LVDS HCMOS	2.5, 3.3

* Available in Commercial and Industrial temperature ranges.

TCXOs & VCXOs

TCXOs & VCXOs

TCXOs	FREQUENCY RANGE (MHz)	STABILITY (ppm)	OUTPUT TYPE	PACKAGE SIZE (mm)
VFTX210	10 - 52	±0.5	SINE WAVE	 20 x 20
VFTX100	200 - 1000	±0.5	LVPECL	 25.2 x 22.2
VFTX130	30 - 180	±0.5	CMOS	

VCXOs	FREQUENCY RANGE (MHz)	APR (ppm)	OUTPUT TYPE	PACKAGE SIZE (mm)
VFVX301	38 - 700	±150	LVPECL LVDS	 5 x 7
VFVX321	60 - 800	±100	LVC MOS LVPECL LVDS	
VFVX100	200 - 1000	±20	PECL/LVPECL	 9 x 14
VFVX110	200 - 1000	±100	PECL/LVPECL	

OCXOs





OCXOs

Applications

- Base Stations
- Test & Measurement
- Wireless Communication
- Networking

Features

- Very Stable Frequency Reference
- Excellent Phase Noise
- Frequency Compensation
 - Oven Control
 - Voltage Control

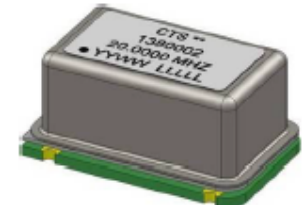
HIGH PERFORMANCE OCXOs	STABILITY (ppb)	FREQUENCY RANGE (MHz)	PHASE NOISE OFFSET 10Hz / 100kHz @ 10MHz (dBc/Hz)	POWER (W)	PACKAGE SIZE (mm)
VFOV100	±10	5 - 120	-125 / -168	1.0	 25.4 x 22
VFOV110	±200	50 - 135	-90 / -174	1.2	
VFOV200	±5	5 - 250	-125 / -160	1.2	
VFOV404 LOW POWER	±5	5 - 250	-127 / -166	0.12	 21.85 x 15.1
NEW Model 144 LOW POWER	±5	8 - 120	-95 / -160	0.15	
VFOV405 LOW POWER	±5	5 - 50	-125 / -165	0.12	 14 x 14
VFOV600	±100	10 - 100	-90 / -170	0.5	 13 x 20
VFOV650	±10	10 - 52	-110 / -168	0.6	

STANDARD PERFORMANCE OCXOs	STABILITY (ppb)	FREQUENCY RANGE (MHz)	AGING (LONG TERM)	POWER (W)	PACKAGE SIZE (mm)
NEW DFO S1	±20	10 - 50	±0.3ppm/20 years	0.3	 9 x 14
Model 137	±250	10 - 26	±2.5ppm/20 years	0.75	 13 x 20
Model 138	±10	10 - 26	±0.7ppm/20 years	0.8	
Model 118	±8	10 - 38.8	±1.5ppm/20 years	1.5	 25 x 25
Model 196	±5	10 - 38.8	±100pp/1st year	1.5	 36 x 27
Model 121	±0.1	5, 10	±300ppb/20 years	2	 51.6 x 51.6
Model 125	±1	5, 10	±300ppb/20 years	2	

MODEL 138 – SINGLE OVEN OCXO

Smallest Stratum 3E OCXO Available

- **Applications:** Telecom Switching – Stratum 3E
GbE and 1588 ToP
- **Frequencies:** 19.44MHz and 20MHz
- **Package size:** Standard 20mm x 12mm x 11mm
Surface Mount or Thru-Hole
- **Frequency stability:** Stratum 3E, 10ppb pk-pk, -40 - +85°C
- **Aging:** 1ppb/Day Drift
- **Phase Noise:** 10Hz @ -125dBc/Hz
100Hz @ -140dBc/Hz
1KHz @ -150dBc/Hz
10KHz @ -155dBc/Hz



Zarlink Recommended for Timing Over Packet and S3E Applications!

LOW POWER OCXOs

VFOV400 & VFOV500

- Oven Power Less Than 10% of Traditional OCXOs - **120mW compared to 1.5W**
- Small Package Size - **15mm x 15mm 10mm**
- High Stability - to **5ppb**
- Low Aging - to **0.5ppb/Day**
- Maximum Fundamental Frequency - **125MHz**
- Maximum Multiplied Frequency - **250MHz**
- **3.3V or 5.0V PSU**
- **HCMOS or SINE Output Type**



HIGH RELIABILITY / COTS

HIGH RELIABILITY / COTS

Applications

- Naval Vessel Circuits
- Air Force Plane Circuits
- Military Land Vehicle Circuits

Features

- Clock Oscillator Devices
- Package Size - from 3.2mm x 2.5mm to 12.62mm x 20.32mm
- Output Frequency - from 0.02MHz to 800MHz
- Stability - from $\pm 20\text{ppm}$ – $\pm 75\text{ppm}$
- Temperature Range - -55°C to $+125^{\circ}\text{C}$ / $+200^{\circ}\text{C}$
- Output Types - CMOS, HCMOS, LVPECL and LVDS
- Phase Noise - as low as $-170\text{dBc}/\text{Hz}$
- Shock - MIL-STD 883, Method 2002, Test Condition B
- Vibration - MIL-STD 883, Method 2007, Test Condition A
- Humidity - Resistant to $+85^{\circ}\text{C}$ @ Relative Humidity 85%

HIGH RELIABILITY COTS	STABILITY (ppm)	FREQUENCY RANGE (MHz)	OUTPUT TYPE	PACKAGE SIZE (mm)
VFH3225 XO	50	25 - 180	CMOS	 3.2x2.5
 VFH5070 VCXO <0.2 ps RMS Jitter	50	1 - 80	CMOS	 5x7
 VFH240C XO <0.5 ps RMS Jitter	75	9.5 - 640	LVPECL LVDS	
VFH230C XO	20	0.75 - 800	LVPECL LVDS	 5x7
VFH2121 XO	25	0.5 - 125	CMOS	
VFH2321 XO	25	0.85 - 165	CMOS	 5x7
T5321 / T5421 XO	25	1 - 100	CMOS	
T5621 / T5721 XO	50	0.016 - 150	CMOS	 12.62 x 20.32
M5500 XO	50	0.00001 - 125	CMOS	
M6306 VCXO	50	1 - 35	CMOS	 12.62 x 20.32

Group A, B, and C testing are available.

HIGH RELIABILITY / COTS



■アプリケーション

- 艦艇、戦闘機、軍用車両用電子回路

■MIL規格適合品

■バーンイン(125°C 68時間)実施

Part Name	Type	Stability	Freq. Range	Phase Noise /Jitter RMS	Output	Temp.	Size
VFH230C	XO	±20ppm	0.75 ~ 800MHz	-112dBc/Hz@1kHz	LVPECL/LVDS	-55 ~ +125°C	5 x 7 mm
VFH2121	XO	±25ppm	0.5 ~ 125MHz	Max 5ps (Vcc=5V)	CMOS	-55 ~ +125°C	5 x 7 mm
VFH2321	XO	±25ppm	0.85 ~ 165MHz	Max 10ps	CMOS	-55 ~ +125°C	5 x 7 mm
T5321/T5421	XO	±25ppm	1 ~ 100MHz	—	CMOS	-55 ~ +125°C	5 x 7 mm
T5621/T5721	XO	±25ppm	0.016 ~ 100MHz	—	CMOS	-55 ~ +125°C	5 x 7 mm
680	XO	±35ppm	0.02 ~ 100MHz	-154dBc/Hz@1kHz	HCMOS	-55 ~ +200°C	5 x 7 mm
VHF5070	VCXO	±50ppm	1 ~ 80MHz	-120dBc/Hz@1kHz	CMOS	-55 ~ +125°C	5 x 7 mm
VFH3225	XO	±50ppm	25 ~ 160MHz	-126dBc/Hz@1kHz	CMOS	-55 ~ +125°C	3.2 x 2.5mm
M5500	XO	±50ppm	1Hz ~ 125MHz	—	CMOS	-55 ~ +125°C	12.62 x 20.32mm
M6306	VCXO	±50ppm	1 ~ 35MHz	—	CMOS	-55 ~ +125°C	12.62 x 20.32mm
VFH240C	XO	±75ppm	9.5 ~ 640MHz	-124dBc/Hz@1kHz	LVPECL/LVDS	-55 ~ +125°C	5 x 7mm

HIGH TEMPERATURE





HIGH TEMPERATURE DEVICES

Applications

- Down Hole Drilling
- Oven Controllers
- Industrial Process Control
- Military

Features

- Clock Oscillator Devices – developed w/ special components and epoxies to perform at extended temperature range
- Crystals - designed specifically to withstand high operating temperature range
- Temperature Range - -55°C to $+200^{\circ}\text{C}$
- Stability - from $\pm 25\text{ppm}$ – $\pm 75\text{ppm}$
- Output Types - CMOS and HCMOS

HIGH TEMPERATURE	STABILITY (ppm)	FREQUENCY RANGE (MHz)	FEATURES	PACKAGE SIZE (mm)
 VFHV570 VCXD $<0.2\text{ ps RMS Jitter}$	50	1 - 80	•APR $\pm 100\text{ppm min}$ •3.3V, 5.0V • -55°C to $+175^{\circ}\text{C}$	 5 x 7
T7250 / T9250 XC	25	0.02 - 100	•3.3V • -55°C to $+200^{\circ}\text{C}$	 5 x 7
T1250 / T3250 XC	75	0.02 - 100	•5.0V • -55°C to $+200^{\circ}\text{C}$	
M1254 / M3254 XC	75	0.02 - 150	•5.0V • -55°C to $+200^{\circ}\text{C}$	 12.62 x 20.32

HIGH TEMPERATURE

■アプリケーション

- ダウンホールドリル
- オープンコントローラ
- ペイントミキサー

Part Name	Type	Stability	Freq. Range	Phase Noise /Jitter RMS	Output	Temp.	Size
T7250	XO	±25ppm	0.02 ~ 810MHz	—	TTL/CMOS	-55 ~ +200°C	5 x 7 mm
680	XO	±35ppm	0.02 ~ 100MHz	-154dBc/Hz@1kHz	HCMOS	-55 ~ +200°C	5 x 7 mm
VFHV570	VCXO	±50ppm	1 ~ 80MHz	-120dBc/Hz@1kHz	CMOS	-55 ~ +175°C	5 x 7 mm
T1250/T3250	XO	±75ppm	0.02 ~ 100MHz	—	TTL/CMOS	-55 ~ +200°C	5 x 7 mm
M1254/M3254	XO	±75ppm	0.02 ~ 150MHz	—	TTL/CMOS	-55 ~ +200°C	12.62 x 20.32 mm

SHOCK & VIBRATION GRADE

SHOCK & VIBRATION

Applications







- Military Vehicles
- Vibrating Test Equipment
- Paint Mixers
- Weigh Scales

Features

- 3 and 4 Point Crystal Mounting
- Stability - from $\pm 0.01\text{ppm}$ – $\pm 75\text{ppm}$
- Output Types – CMOS, HCMOS, LVPECL and LVDS

Manufacturing Process

- Stabilization Bake - MIL-STD 883, Method 1008, Condition B
- Temperature Cycling - MIL-STD 883, Method 1010, Condition B
- Centrifuge - MIL-STD 883, Method 2001, Condition A
- Burn-In - MIL-STD 883, Method 1015, Condition B
[+125°C for 168 hours w/ bias]
- Fine Leak - MIL-STD 883, Method 1014, Condition A1
- Gross Leak MIL-STD 883, Method 1014, Condition C
- Electrical Test at +25°C and temperature extremes:
 - Frequency - Duty Cycle [NL] - "Zero" Logic Level
 - Current - Duty Cycle [FL] - "One" Logic Level
 - Rise Time [FL] - Frequency @ +5.5V
 - Fall Time [FL] - Frequency @ +4.5V

SHOCK & VIBRATION RESISTANT	STABILITY (ppm)	FREQUENCY RANGE (MHz)	OUTPUT TYPE	PACKAGE SIZE (mm)
 Model 148 Power Consumption $\le 0.23\text{W}$	50	1 - 80	HCMOS	 14 x 14
VFH230C XD	20	0.75 - 800	LVPECL LVDS	 5 x 7
M5500 XD	50	0.000001 - 125	CMOS	 12.62 x 20.32
M6306 VCXO	50	1 - 35	CMOS	 12.62 x 20.32
M1254 / M3254 XD	75	0.02 - 150	CMOS	 12.62 x 20.32

SHOCK & VIBRATION GRADE

■アプリケーション

- 軍用車両
- 振動試験装置
- ミリタリー

■MIL規格適合品

Part Name	Type	Stability	Freq. Range	Phase Noise /Jitter RMS	Output	Temp.	Size
148	OCXO	±0.01ppm	8 ~ 100MHz	-162dBc/Hz@1kHz	HCMOS	-40 ~ +85°C	14 x 14 mm
VFH230C	XO	±20ppm	0.75 ~ 800MHz	-112dBc/Hz@1kHz	LVPECL/LVDS	-55 ~ +125°C	5 x 7 mm
M5500	XO	±50ppm	1Hz ~ 125MHz	—	CMOS	-55 ~ +125°C	12.62 x 20.32mm
M6306	VCXO	±50ppm	1 ~ 35MHz	—	CMOS	-55 ~ +125°C	12.62 x 20.32mm
M1254/M3254	XO	±75ppm	0.02 ~ 150MHz	—	TTL/CMOS	-55 ~ +200°C	12.62 x 20.32 mm

セラミック・コンポーネント

MONOBLOCK RF FILTERS

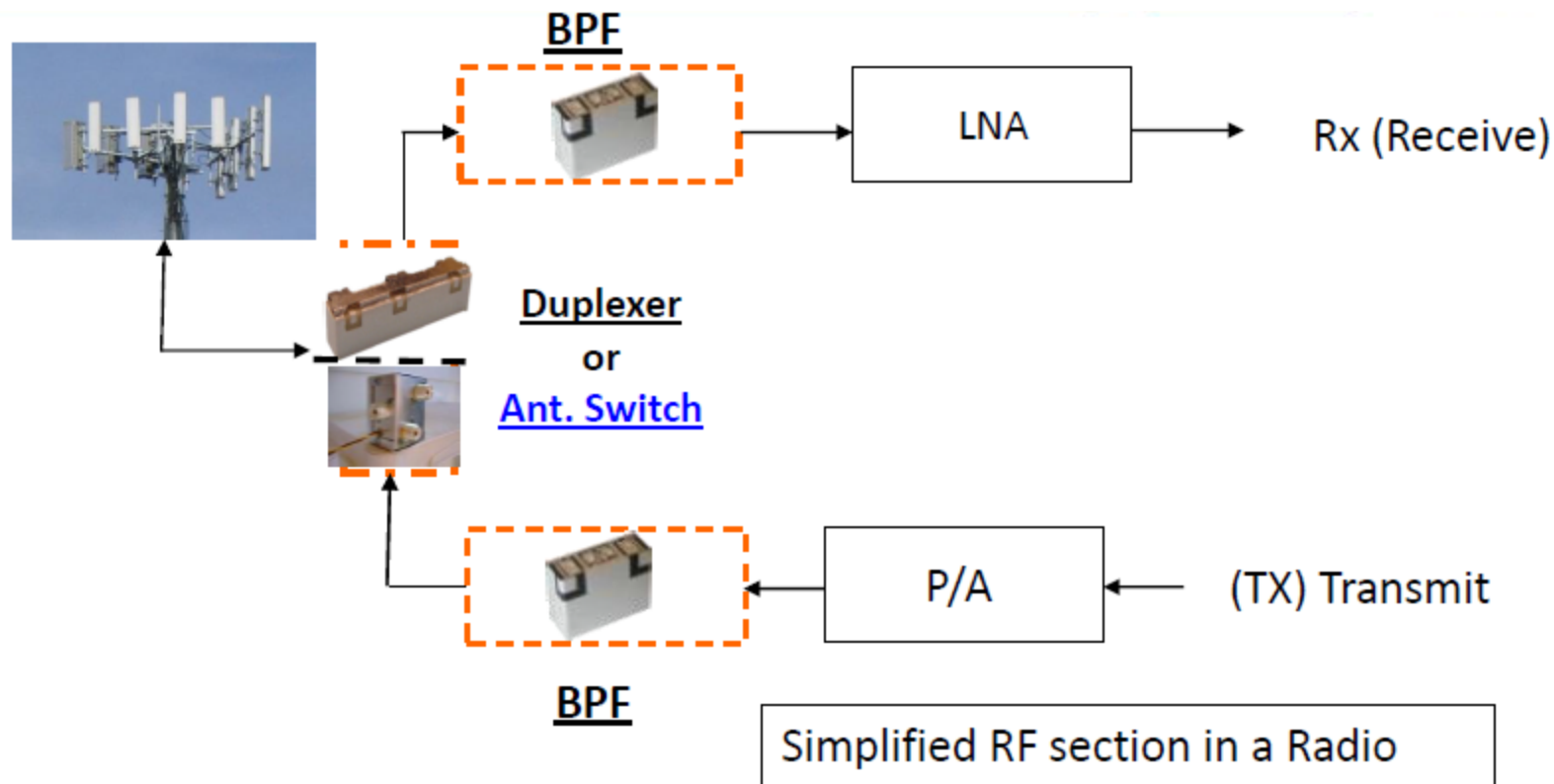
Actiplex™

CLEARPLEX®

CTS社モノブロックフィルターの特徴

- CTS社はモノブロック・タイプのセラミックフィルタのリーディング・カンパニーの1つ。
- セラミックパウダーから最終製品まで製造。
- モノブロックフィルターの設計、製造に関する70以上の特許を保有。
- セラミック・モノブロック・フィルターは同軸共振器フィルタに対して以下の利点あり。
 - ✓ 低価格
 - ✓ 小型
 - ✓ 高信頼性 (MTTF>400 years)
 - ✓ クラス最高のパフォーマンス
- CTS社のモノブロック・フィルタは、個別のアプリケーションに最適化されている。
- 最短4週間でカスタマイズされたサンプルの提供が可能。
- 今後、air-cavityタイプのフィルタの代替として、ハイパワー、ハイパフォーマンスの製品開発をより充実。

モノブロックフィルターの使用箇所



アプリケーション例

Monoblock BPF And Duplexers



RTP BPF and Duplexers



Products

Applications



Repeaters



Airborne RF Systems



Wireless Base Station



Wireless Base Station



RRH



Munitions



WiMAX / LTE

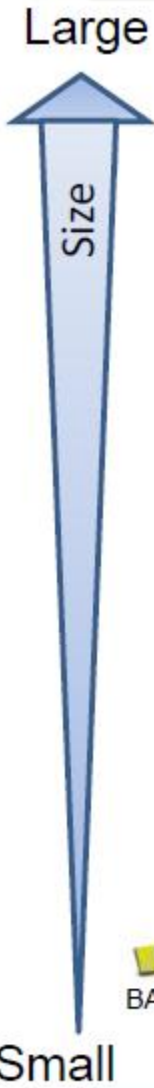


RRH



Airborne RF Systems

400MHz~6GHz フィルタ・テクノロジー **Daitron**



Air-Cavity Technology



CTS Ceramic ClearPlex™

Coupled Resonator

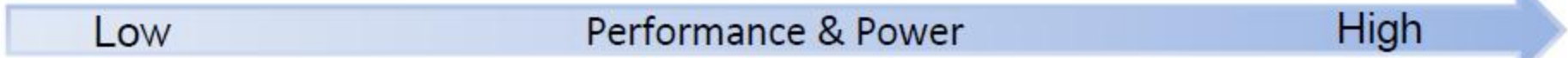


Monoblock



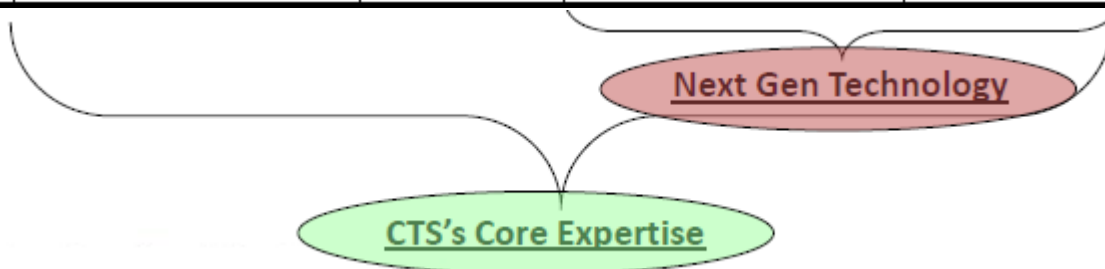
BAW

SAW



RFフィルタ・テクノロジー

	SAW Filters	Mono Block RF Filter	Duplexer	RTP Filters & Duplexers	WaveGuide	Air Cavity Filter
Description	Low Loss, Comblin	Low loss, stable comblin		Low loss, stable comblin	Low loss, stable, ceramic waveguide	Low loss Comblin
Applications	Consumer, Access Points	Wireless, GPS Infra	Low to medium power FDD	Low to medium power FDD Wireless, GPS Infra	RRH for TDD, Aerospace, PTP	Medium to High power wireless
Critical performance attributes	IL<5dB 20to 30dB rejection Avg/Peak Power up to 0.25W/2.5W Very small size	IL<2dB, 40 to 60dB rejection Avg/Peak power up to 20/250W	IL<2dB, 40 to 60dB rejection	IL<2dB, 40 to 65dB rejection Avg/Peak power up to 20/250W	IL<1.5dB, rejection 40 to 70dB Avg/Peak Power upto 50W/500W	IL<1dB, rejection 60 to 80dB Avg/Peak up to 100/500W
Performance Limitations	Limited Power/IL/rejection capabilities	IL too much for TX, rejection is not always sufficient for RX	Same as monoblock filter	Same as monoblock filter	Limited Power Dissipation may apply to fanless apps	Largest of the options



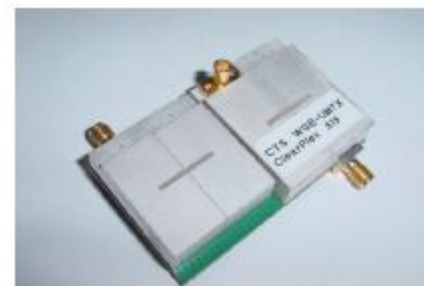
- **ClearPlex[®] Band Pass Filter**

- Power Ratings up to 40 W average 400 W Peak
- Block Configuration & Size – multi-pole frequency dependent
- Passive Intermodulation (PIM) <110dBm
- Frequency Range – 1700 MHz to 10 GHz
(predesigned selected bands)



- **ClearPlex[®] Duplexer**

- Power Ratings up to 40 W average 400 W Peak
- Block Configuration & Size – dual block multi-pole frequency dependent
- PIM <-110dBm
- Isolation <-80dB
- Frequency Range – 1700 MHz to 10 GHz
(predesigned selected bands)



セラミック EMI/RFI コンポーネント

COAXIAL BROADBAND Broadband
EMI/RFI FILTERS

HIGH FREQUENCY, LOW PASS
EMI/RFI FILTERS

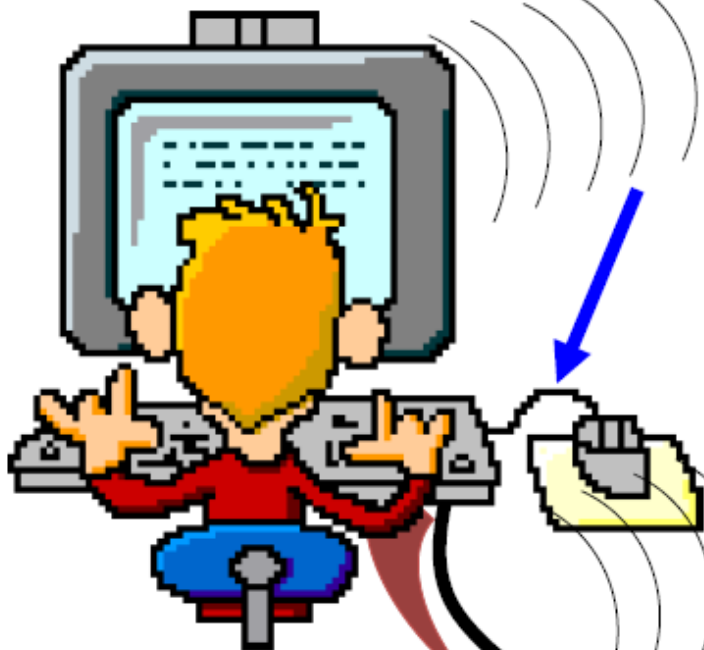
EMI/RFI SURFACE MOUNT FILTERS

Product Applications

- Telecommunications
- Networking Equipment
- Automotive
- Healthcare
- Energy
- Commercial/Industrial Lighting
- Home Security
- Industrial Controls/Instrumentations
- GPS
- Military/Aerospace

Common EMI Scenarios

Radiated Emissions



Radiated Susceptibility

EMI Shielding Products

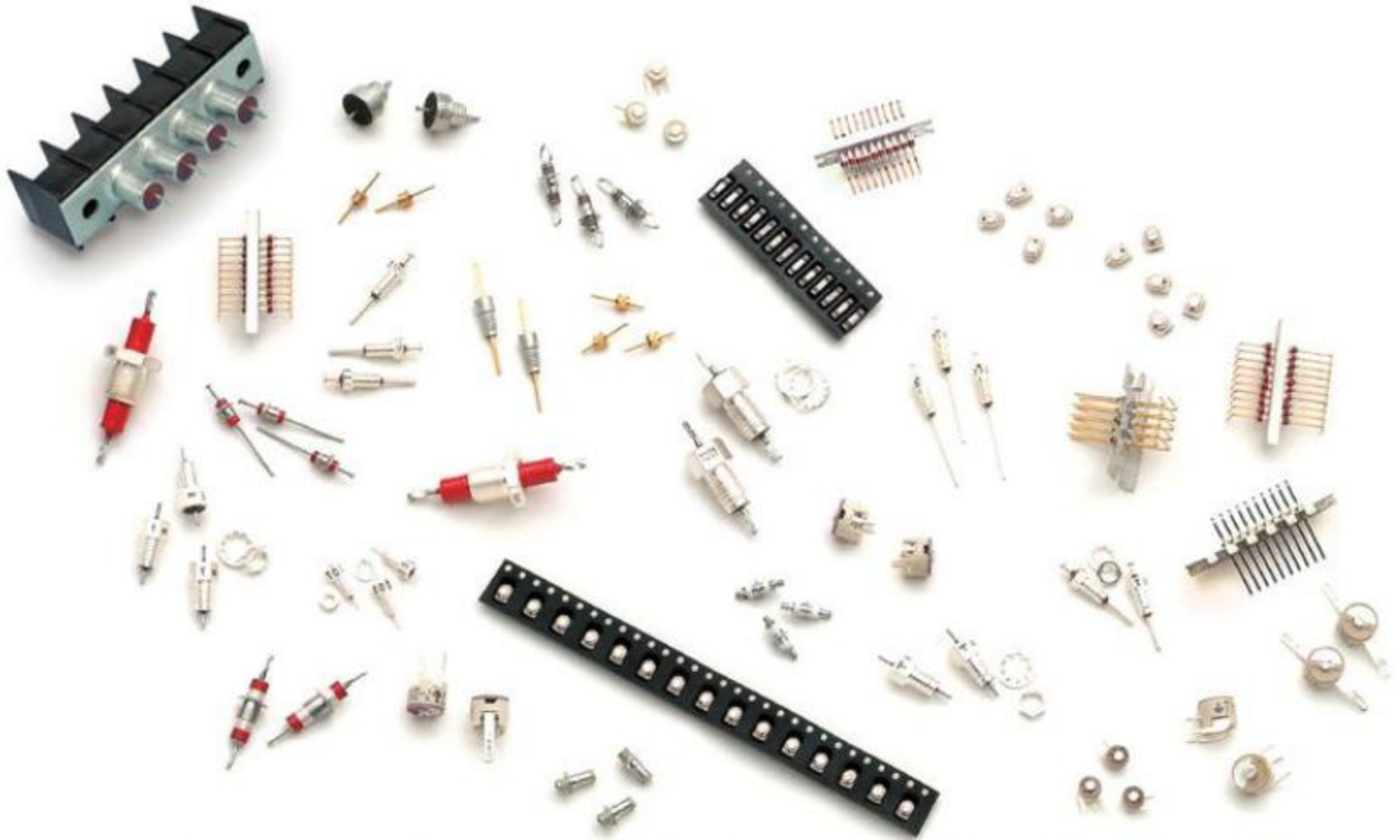


Conducted Emissions

EMI Filter Products

Conducted Susceptibility





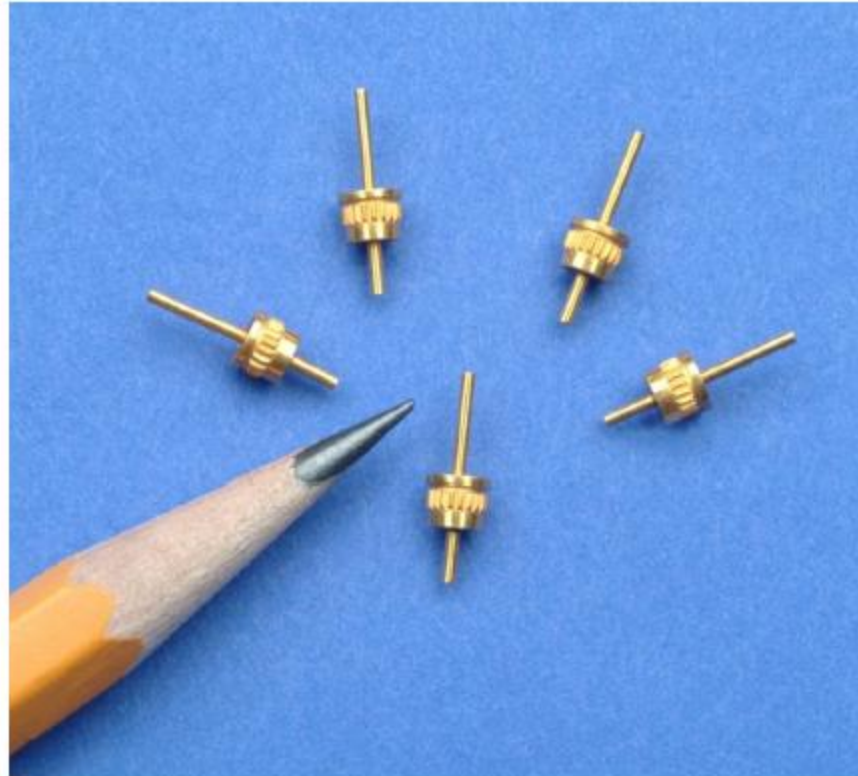
Offering a wide variety of Electromagnetic Interference (EMI)
and Radio Frequency Interference (RFI) Filters

Miniature EMI/RFI Filters, bushing or solder mount



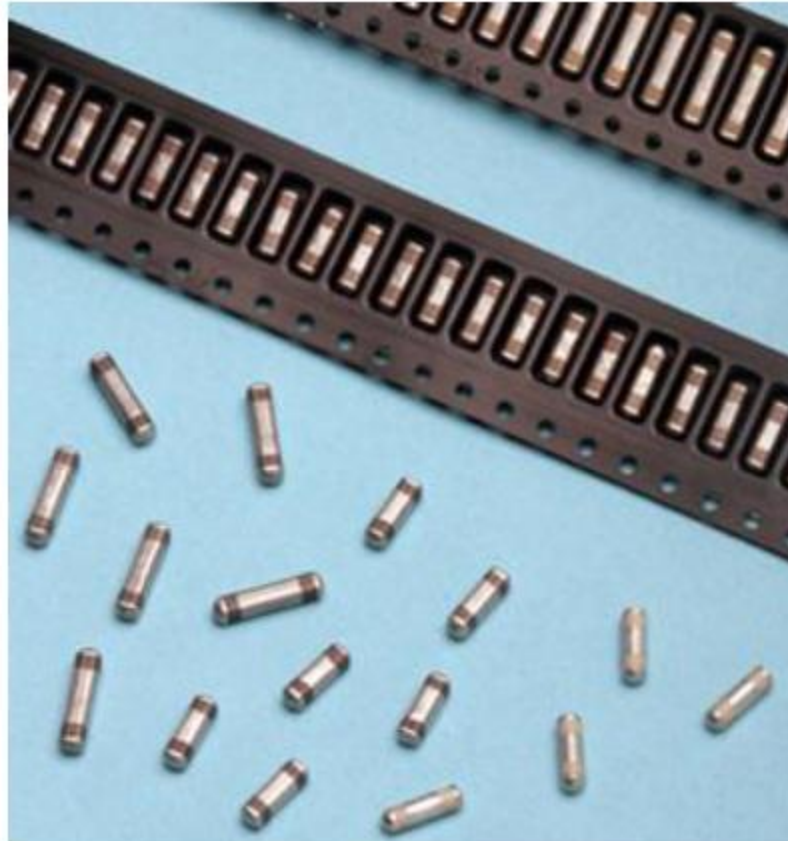
CTS has a diverse product offering to meet industry standards and specifications.
Customization is also possible.

Press-in ceramic EMI filters 4306 & 4304



CTS Tusonix was the first to market with
Ultra Miniature press-in filters

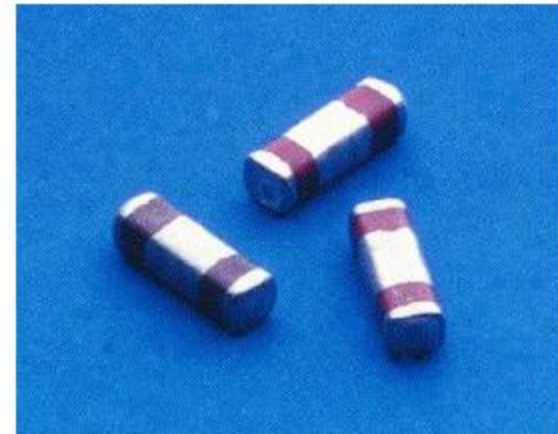
Tin Plated over Fired-on Silver with Nickel Barrier
Current up to 20A and test Voltage up to 2121VDC



CTS is the largest manufacturer of surface mount filters.

Specification Ranges

100VDC up to 125°C
Dielectric Withstanding 300VDC
4700/4701 DC Rating 10 AMPS
4702 DC Rating 20 AMPS
Capacitance 100pF to 5000 pF
Tolerance GMV or +80%/-20%
Insertion Loss 70dB up to 1 GHz



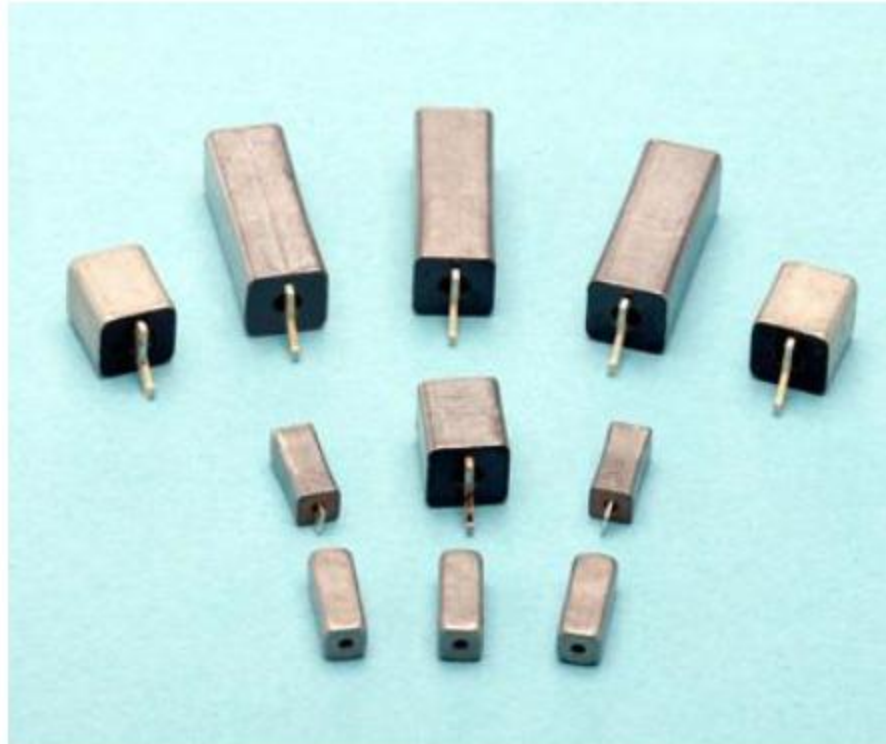
Features

Excellent Performance
Easy Placement
Excellent Solderability
Round or Square Body for
Easy Handling
Tape and Reeled for Auto-
Placement

Benefits

Eliminates EMI at Board Level
Fast Production Rates
Reduces PCB Component Count
Saves Board Space
Design Choices
Increased Productivity
Cost

Tin Plated over Fired-on Silver with Nickel Barrier



CTS' Nickel Barrier protects silver from leaching during reflow process.
The result is a much higher "Q"



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