



Confidential

TST Company Profile

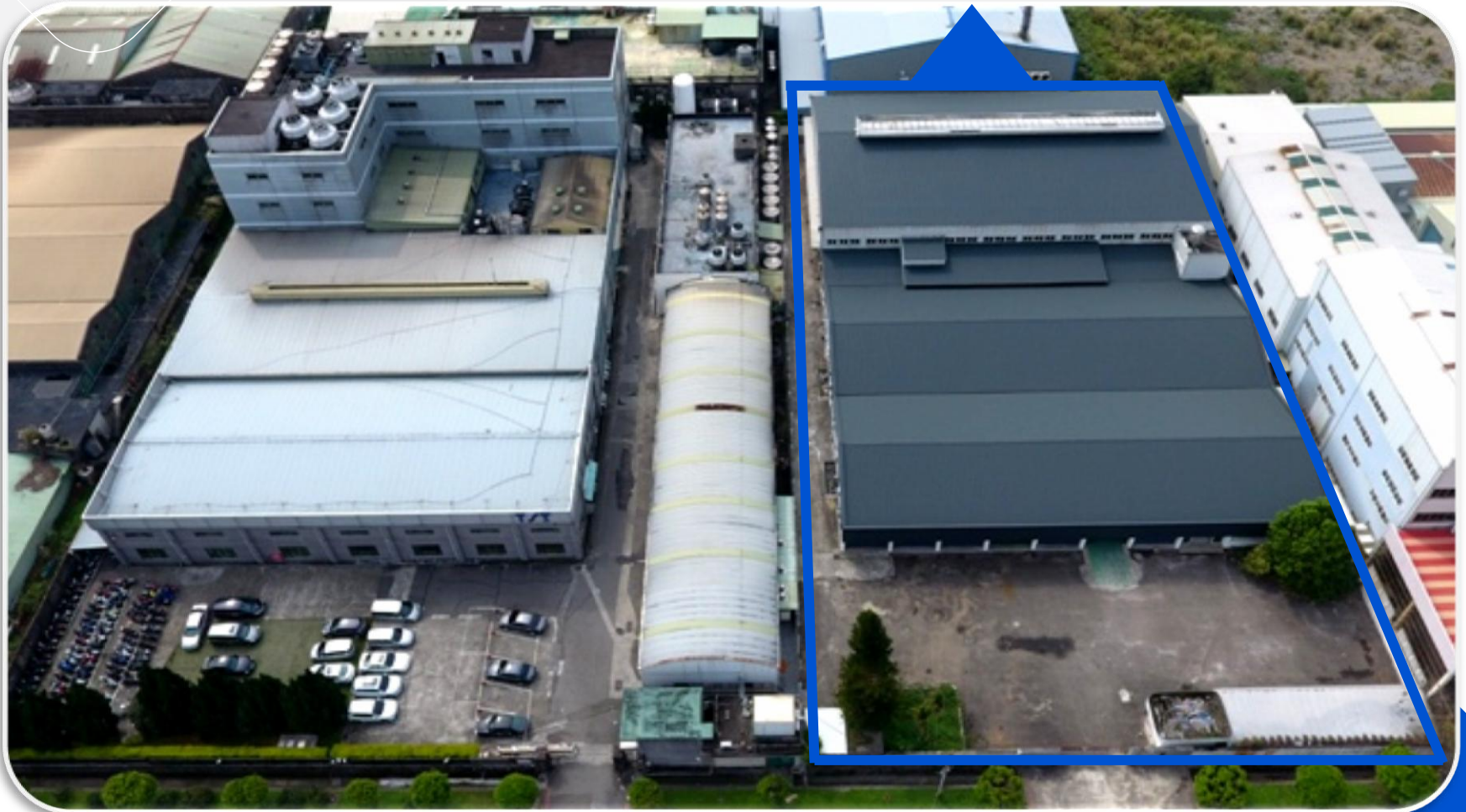
Your Best Partner for Frequency Devices



Milestones



New area



Facility Size

Land: 76,413ft² (7,099m²)

Plant: 115,700ft² (10,749m²)

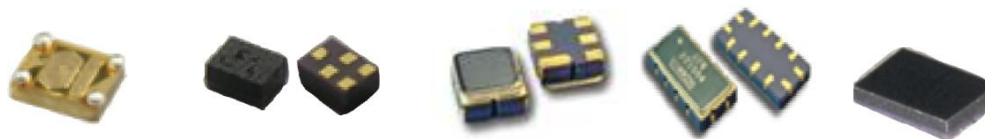
Facility Size

Land: 58,017ft² (5,390m²)

Plant: 36,621ft² (3,402m²)

Product Line

SAW



WLP

DPX, Filter

RF SAW

IF SAW

QPX

Xtal/Osc



Xtal

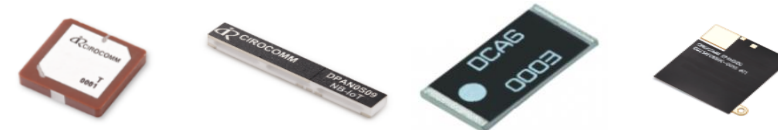
XO/TCXO

VCXO

VCTCXO

OCXO

Antenna



• Patch

• Linear

• Chip

• FPC /PCB

DR /LTCC Filter



• 3500Mhz

• 5G Tri-Band

• 2.4GHz

Module



• NB-IoT

• External GPS

• Internal GPS

RFFE

RFFE

Motto & Management Rationale



[Dedication] [Trustworthiness]
[Exactitude] [Innovation] [Excellence]

“ To strive for the growth and excellence of all our employees;
meanwhile, contribute to the advancement of global community. ”

全體同仁攜手致力追求卓越與成長，為世界的進步做出貢獻！

With all of your Strong Supports, TST is going to be **25** yr !



TST in a Glance

Headquarters Ping-Chen Industrial Park,
Taoyuan, Taiwan (ROC)

Capital US \$34.1 million
(paid in)

Revenue US \$100 million
(consolidated revenue)

Employee 1,000

**Production
Facility Size** Taiwan: 28,079m²
China : 24,334m²

**Capacity
(by month)** 120M SAW devices
120M Xtal devices



MFG Operations



Ping-Chen Factory

No 3, Industrial 2nd Road, Ping-Chen Industrial District,
Taoyuan, 324, Taiwan, R.O.C.

Floor Space (m ²)	13,079	Product Category	SAW: 1.1*0.9 ~22*8 Xtal: 1.6*1.2 ~ 5*7
Employee	490	Capacity	SAW: 63m/month Xtal: 45m/month

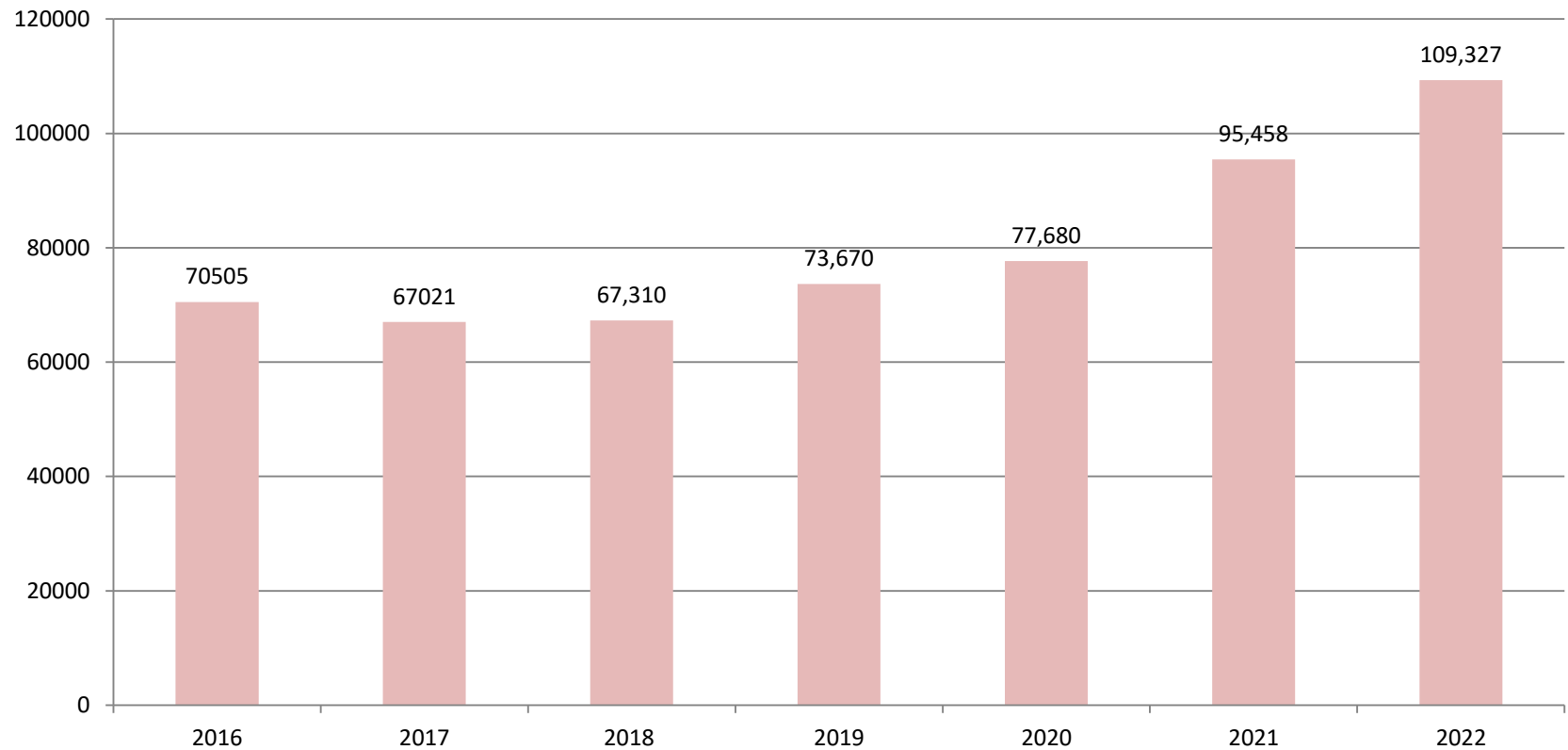
Wuxi Factory

1231, LienfuRd., Xishan Economic Development Zone,
Wuxi, Jiangsu, 214101, China

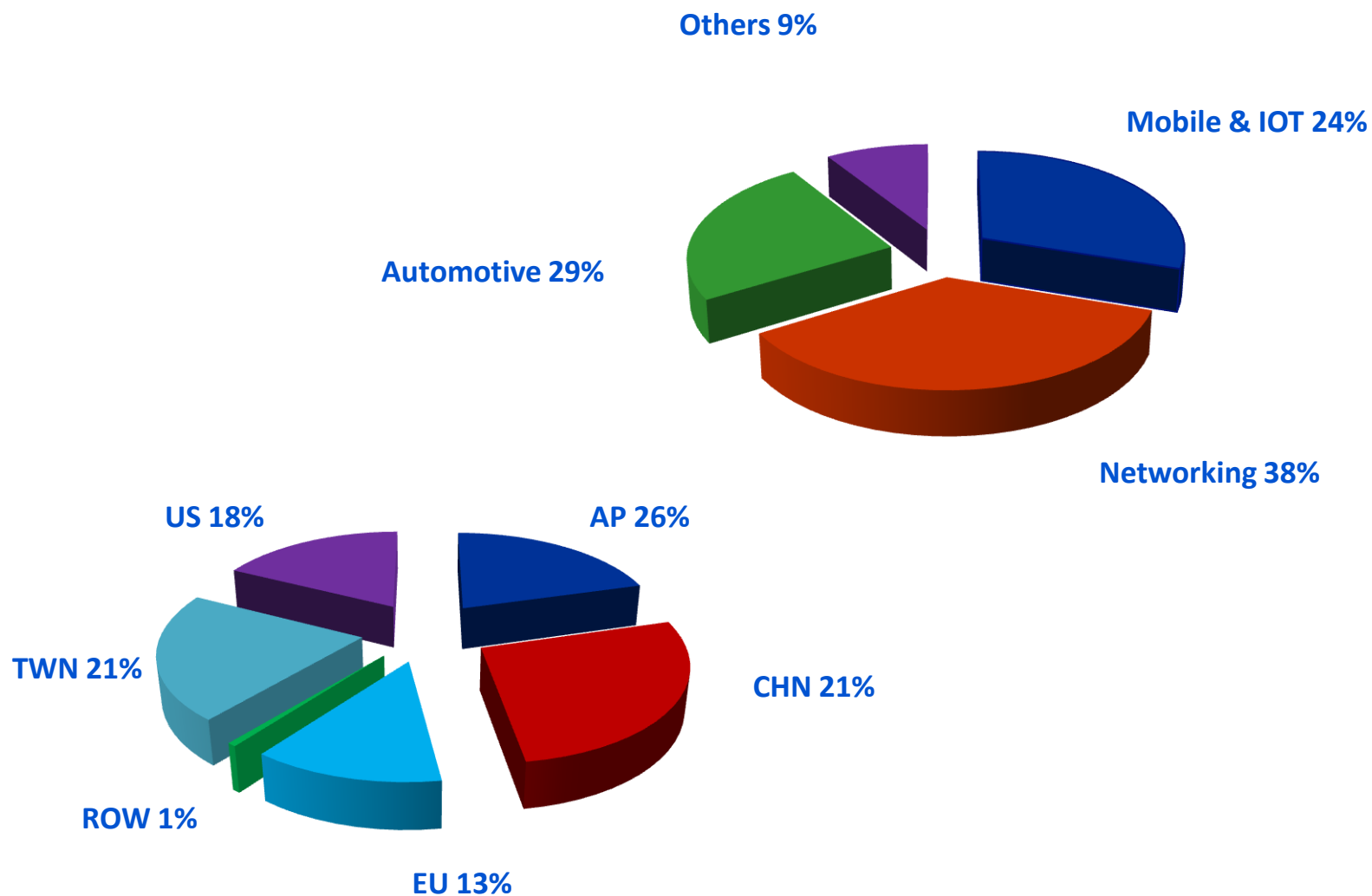
Floor Space (m ²)	24,334	Product Category	SAW: 3*3 & DIP Xtal: 3.2*2.5 & DIP
Employee	230	Capacity	SAW: 37m/month Xtal: 35m/month

Business Portfolio-Revenue

TST Sales revenue (US\$K)



Business Portfolio-Revenue



Customers



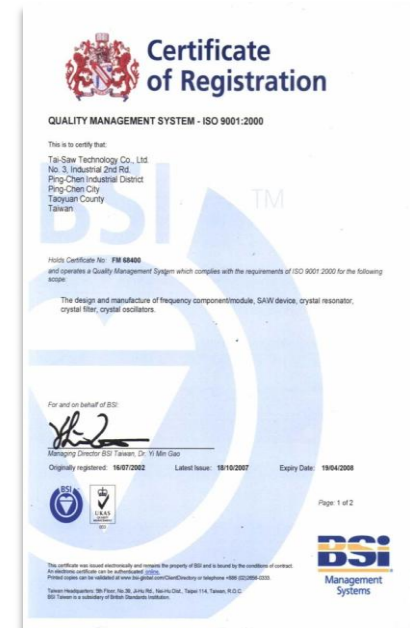
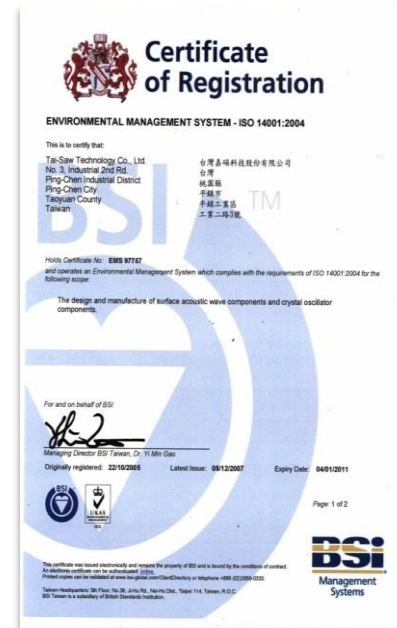
Product Quality Assurance

Enhanced reliability in the temperature range of -40~125°C
Certified with international standards

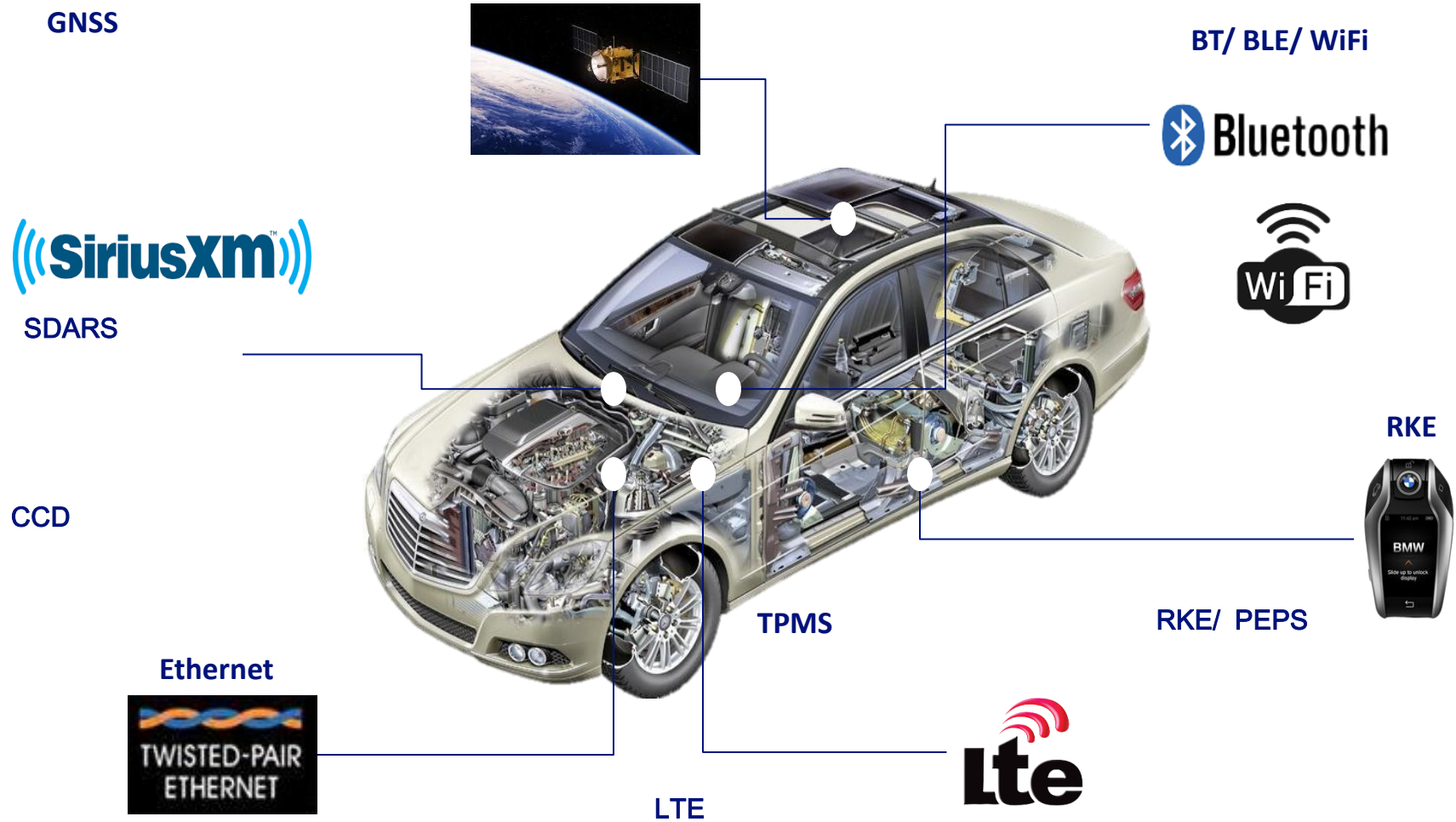
- ✓ IATF16949
- ✓ AEC-Q200
- ✓ ISO 9000
- ✓ ISO 14000
- ✓ ISO 13485
- ✓ Delphi certified
- ✓ Visteon certified
- ✓ Denso certified



TAIWAN EXCELLENCE



TST in Automotive Applications



IC Chipset reference BOM

Qualcomm, Mediatek, Ti, Silab, Nvidia, Broadcom, Realtek, NXP, Marvell, Dialog, Infineon, Cypress, STM, Microchip



Qualcomm Technologies, Inc.

CREATE DATE: 25-Feb-2020
 REVISED DATE:
 BUYER: Eason Chang

SUPPLIER: ID: 253889
 TAI SAW TECHNOLOGY CO LTD
 PSG ASSOCIATES INC
 PO BOX 2967
 SARATOGA, CA 95070
 United States

PO STATUS: Approved
 GOVERNING CONTRACT: QC GTCs
 PAYMENT TERMS: NET 30

FREIGHT/INCO TERMS:
 CARRIER: UPS
 SERVICE LEVEL: Specify in Notes

ATTN: STEPHEN GOU

Comments:



www.ti.com

Crystals for CC26xx and CC13xx

6 Crystals for CC26xx and CC13xx

Table 3 through Table 5 provide appropriate crystals for use with the CC26xx and CC13xx devices.

Table 3. 48-MHz Crystals Suitable for CC13x2 and CC26x2

Manufacturer	MPN	Package	ESR max [Ω]	CL [pF]	Tol [ppm]	Temp tol [ppm]	Temp range [°C]	Used in TI reference	Comment
Kyocera									
NDK									
TXC									
Tai-Saw (TST)	TZ2365D	2016	40	7	±10	±25	-40/105	CC26x2REM-7ID-Q1	Used for CC2642R-Q1 characterization

Application Note AN076

AN076

Using the TAI-SAW TA0801A SAW Filter and External PA with the CC11xx Radios in the 868 MHz Band

By Greg Amidon

Keywords

- SAW (Surface Acoustic Wave) Filter
- CC1101, CC1110, CC1150
- ETSI (European Telecommunications Standards Institute) Compliance
- 868 MHz

Table 8.1. 38.4 MHz Crystals

Mfg	Part	ESR (Ω)	C ₀ (max) (pF)	Temp (°C)	Temp Tolerance (ppm)	Mfg Tolerance (ppm)	C ₀ (pF)	Footprint (mm)
KDS								
KDS								
Kyocera								
Kyocera								
Kyocera								
NDK				+125				
TaiSaw	TZ2205E	40	9	-40 to +125	±30	±10	10	1.6 x 2.8
TaiSaw	TZ0905E	50	9	-40 to +125	±30	±10	10	2.0 x 2.8
NDK								



SILICON LABS

AN0016.1: Oscillator Design Considerations

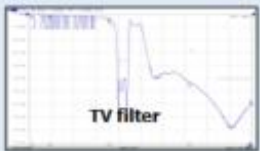
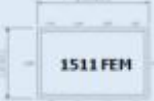
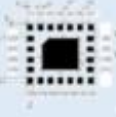
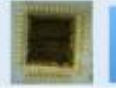
SAW Product Road Map 1

RF SAW/BAW Filter & DIX/DPX

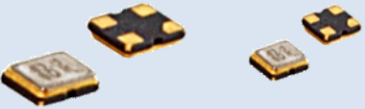
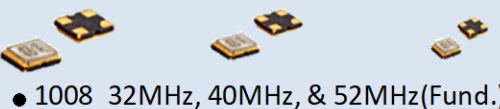
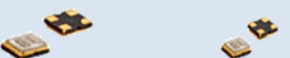
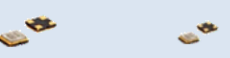
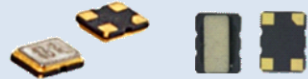
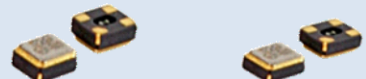
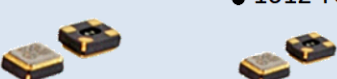
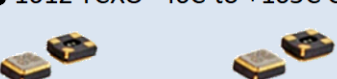
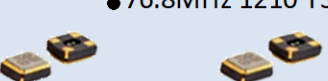
	Available	2022	2023	2024	2025	
RF SAW/BAW	■ 3030 3838 5050 5070 1365 1965 2590 Chip&Wire all applications ■ 2520 2016 Chip&Flip bonding Type ■ 1109/1411/2016 CSP LTE, GPS,Wifi,IOT,Meter ■ 5.2G/5.6G 2520 BAW ■ 1109/1411 for L1/L2/L5 GPS ■ GPS/GNSS 1109 SAW/TC-SAW ■ 2.4G BT/WiFi SAW/TC-SAW	■ 0907 CSP size ES ■ GNSS High-Selectivity TC-SAW MP ■ 2.4G WiFi High-Q SAW ■ Broad Band GPS/GNSS MP ■ Low loss L1 GPS ES ■ B41 full 194M BW 1109 MP	■ 0907 CSP size MP ■ High Q SAW(Q>2500) ■ 2.4G WiFi High-Q SAW MP ■ HQ build a library (4-Types)	■ 0806 size MP ■ 5G/6G/7G WiFi MP ■ HQ Product MP ■ 5G/6G/7G WiFi Filter MP ■ High Freq Trimming Product MP	■ 0604 UT SAW MP ■ WLCSP BAW MP	
	■ Sub-GHz BAW MP					
	 3.0x3.0 mm ⁴	 2.5x2.0 mm ⁴ 2.0x1.6 mm ⁴	 1.4x1.1mm 1.1*0.9mm	 < 0.8x0.6mm	 0.9x0.7mm	 5G/6G/7G 2.5x2.0mm BAW
	 Piezoelectric layer Functional layer H-layer Supporting Substrate					 3BAW filter die Gold bumps
DIX/MPX & DPX	■ DUP 3838 B2,4,5,8,12,14,20 ■ DUP 2016 B1,2,4,5,8,13,17 ■ DUP 1814 B1,2,3,4,5,7,8,12,13 B14,17,20,21,25,26,28AB,66 ■ DIP 3838 RKE ■ DIP 3030,1511 L1+L5, L1+L2 GPS ■ Dual 3030 B34+39 ■ Dual 1511 B1+B3. B34+B39	■ Dual-band (Low) Rx MP ■ Dual-band (Low) Tx MP ■ Triplexer 1814 B1,3,7 MP ■ DUP 1612 B1,2,3,5,7, 8 MP ■ DIP 1511 L1+L5 AEC-Q MP ■ DIP 1511 L1+L2 AEC-Q MP ■ DIP 1511 L1+L2+L5 MP	■ Tri-band (Middle) Rx MP ■ Tri-band (Middle) Tx MP ■ DUP 1612 B66 MP ■ DIP GPS 1411 MP ■ Dual GPS 1411 MP ■ WiFi/GPS extractor ES	■ Dual SAW 1109 MP ■ Hybrid MPX ES ■ WiFi/GPS extractor MP	■ Multi-band MP ■ DIP <1210 MP ■ Hybrid MPX MP	
	 	 DIX  QPX/MPX				
	 SAW Integrated Ceramic					

SAW Product Road Map 2

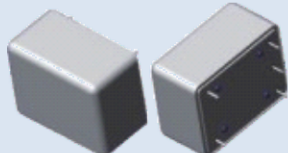
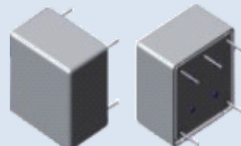
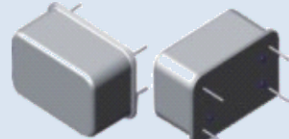
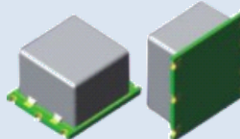
Notch & Module & Packaging

	Available	2022	2023	2024	2025
Band stop filter	- GNSS Notch Filter 3030 MP - GPS Notch Filter 3030 MP - DVB Notch Filter 3030 ES (1) 847_897.5MHz (2) 836_5_897.5MHz (3) 733_760MHz (4) 916.5_917.5MHz (5) 788_798MHz	2.3G SDARS Notch Filter 1411 MP 2.4G WiFi Notch Filter 3030 MP 2.3G SDARS Notch filter 3030 MP 2.4G WiFi Notch Filter 1411 MP	5G/6G/7G Notch Filter MP - GNSS Notch Filter <1411 MP - UHF Notch Filter MP - GNSS Notch Filter <1411 ES 2.4G WiFi Notch Filter 1411 MP	>7G Notch Filter MP	
	    				
Module / Packaging	- GNSS FEM L1 2525 - GNSS FEM L1 1511 - L2 1511 FEM MP - L5 1511 FEM MP - L2 + E5b 1511FEM - QFN Packaging	- Multi-Band Module MP - WiFi LNA FEM MP - GNSS FEM MSL1 ES - L2+L5+G2+E5b 1511FEM MP - QFN HPA Packaging - GGI Laminate Packaging - Sensor Packaging (Gas/Temperature/Bio)	- DTV FEM MP - GNSS FEM MSL1 MP - QFN Packaging (High Power >50W) - MEMs/Optics Packaging	5G/6G/7G Module MP - WiFi PA Module MP - Customized Packaging	5G NR Module MP - Sensor Module MP
	   			   	   

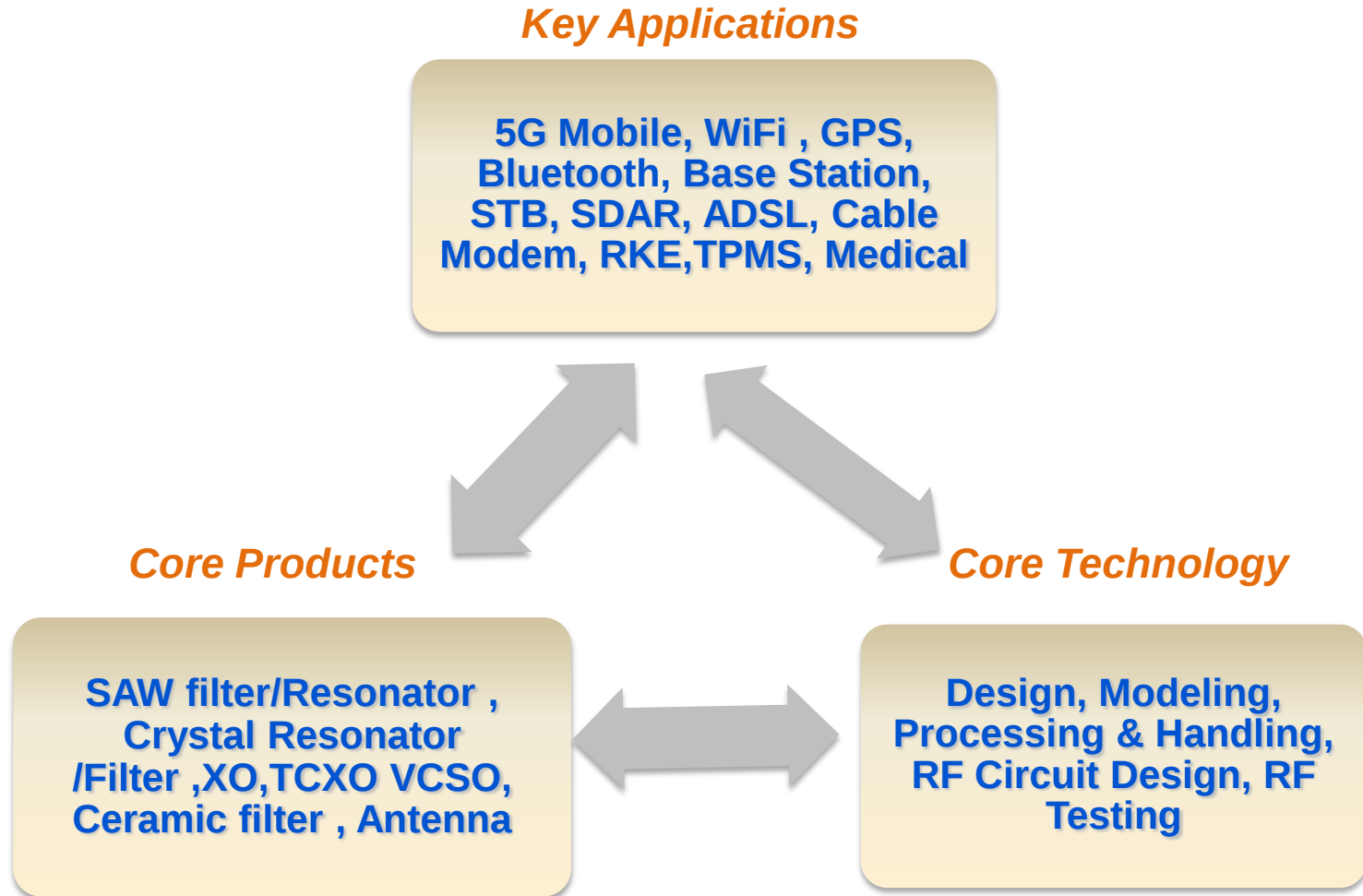
Crystal Product Roadmap 1

	Available	2023	2024	2025	2026
Crystal	● 3225 8MHz ● 2520 54MHz+/-3ppm ● 2016 16~96MHz(Fund.) 	● 1612 24~96MHz(Fund.) ● 1210 78.125MHz, 80MHz, 96MHz, 100MHz, & 120MHz(Fund.) ● 1008 32MHz, 40MHz, & 52MHz(Fund.) ● 1210 26MHz, 32MHz, 37.4MHz, 40MHz, 48MHz, 76.8MHz (Fund.) 	● 1008 48MHz, 76.8MHz, 80MHz(Fund.) 	● 1008 80MHz, 96MHz(Fund.) 	
	Available	2023	2024	2025	2026
TCXO	● 2016 TCXO 19.2, 26, 52MHz 1.8~3.3V 0.5 & 2 ppm ● 3225 RTC TCXO 32.768K 	● 2520 /2016 TCXO 0.5 ppm -40C to +105C CS AEC-Q200 ● 2520 /2016 TCXO 2.5ppm -40C to +105C CS/CMOS Enable AEC-Q200 ● NPC 2520 /2016 TCXO 2.5 ppm -40C to +85C CS ● 1612 TCXO ● 2113 RTC TCXO 32.768K 	● 2520 /2016 TCXO 0.5 ppm -40C to +125C CS Enable AEC-Q200 ● 2520 /2016 TCXO 76.8MHz & 96MHz 0.5 ppm -40C to +85C CS 	● 1612 TCXO -40C to +105C CS AEC-Q200 	● 1612 TCXO -40C to +125C CS AEC-Q200 
	Available	2023	2024	2025	2026
TSX	● 26MHz 2520 TSX(Large Cm) ● 26MHz 2520 TSX (Small Cm) ● 26MHz 2016 TSX (NB IoT) 	● 26MHz 2016 TSX (Mobile) ● 76.8MHz 1612 TSX ● 55.2MHz 2016 TSX(UWB) Automotive 	● 52MHz 1612 TSX 	● 52MHz 1210TSX ● 55.2MHz 1612 TSX(UWB) Automotive ● 76.8MHz 1210 TSX 	

Crystal Product Roadmap 2

	Available	2023	2024	2025	2026
XO	● 2016 XO 2~125MHz 1.8~3.3V ● 2520XO 2~125MHz 1.8~3.3V ● 3225 XO 2~125MHz 1.8~3.3V 	● 2016 /2520 Ultralow Low Current 32.76K XO ● 2520 3225 200fs Jitter 25MHz~320MHz LVPECL/LVDS/HCSL ● 2520 3225 50fs Jitter 25MHz~320MHz LVPECL/LVDS/HDSL ● 3225 2520 2016 1~200MHz Programmable XO 			
	Available	2023	2024	2025	2026
OCXO	● DIP50x50 OCXO 5~40MHz 0.1~100ppb 	● DIP25x25 OCXO 5~40MHz 5~100pb ● DIP20x20 OCXO 5~40MHz 5~100ppb 	● SMD14x9 OCXO 10~40MHz 30~300ppb ● SMD 9x7 OCXO 10~40MHz 30~300ppb 	● SMD14x9 OCXO 10~40MHz 30~300ppb Low g-sensitivity 	● SMD7x5 OCXO 
	● DIP36x27 OCXO 40~120MHz 5~100ppb	● SMD25x22 OCXO 5~40MHz 5~100ppb ● DIP21x13 OCXO 5~40MHz 30~100ppb Ultra Low Power 95mW max	● DIP36x27 OCXO 100MHz Noise Flow -190dBc/Hz	● DIP25x25 OCXO 10MHz -140dBc/Hz @10Hz	● DIP36x27 DOCXO Low Noise/ Low Jitter
	Available	2023	2024	2025	2026
Technology	● 2016 Ring Wall Type ● 1612 Ring Wall Type ● 80MHz, 96, & 100MHzMHz fund Blank ● Process Control for High Freq Blank 96MHz	● FC Cut Blak for Tight TCF ● Process Control for Tight Fre Tol +/-3ppm	● Bi-Mesa blank for 1210 xtal ● Photoquarz for 1210 xtal ● Inverted MESA for 1210 xtal	● Bi-Mesa blank for 1008 xtal ● Photoquarz for 1008 xtal	

Solutions for Various Applications



Thank you for your attention.

Please Visit Our Web Site at



<https://www.taisaw.com>

or

Write an e-mail to



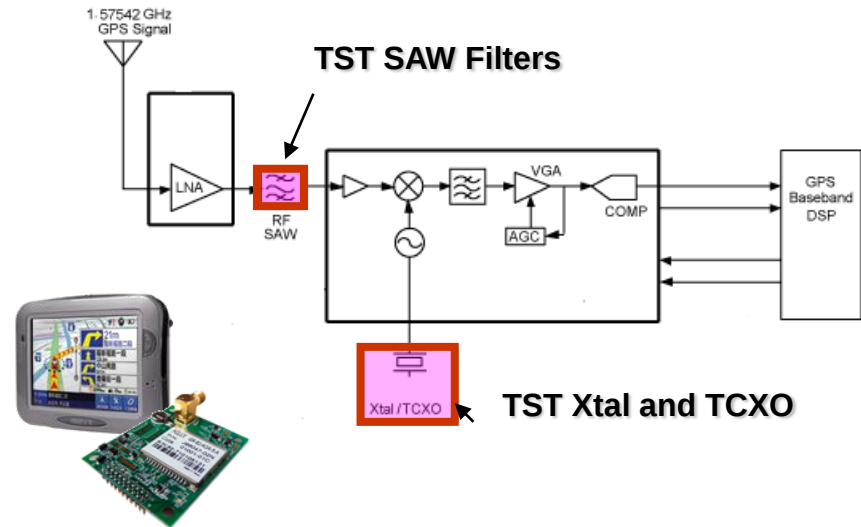
vincentlee@mail.taisaw.com

TST SAW Business Unit

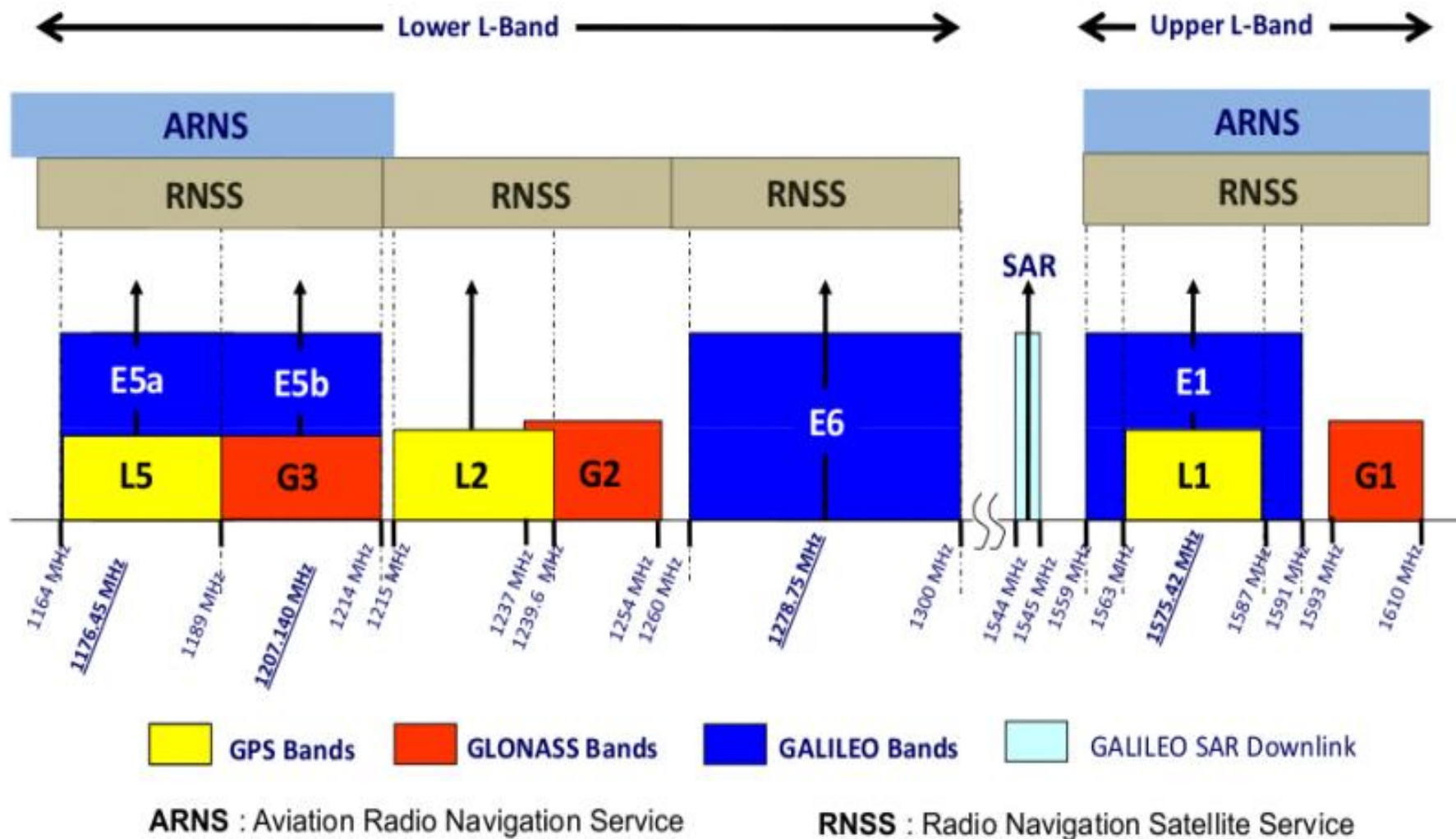
Products & Technology

GNSS Application

GPS, GLONASS, Galileo, Beidou



GPS L Band



GNSS Single SAW Filter



*AEC-Q200 Confidential

TST P/N	Frequency (MHz)	Insertion Loss (dB)	Band Width (MHz)	Size (MM)	Note
TA2852AA0023	1278.5	1.6	40	0.9x0.7	B3+E6 New
TA2887AA0021	1176.45	1.8	20.46	0.9x0.7	GNSS L5 New
TA2888AA0021	1582.47	1.7	46.84	0.9x0.7	GNSS upper L-band High Att. New
TA2889AA0021	1582.47	1.1	46.84	0.9x0.7	GNSS upper L-band low loss New
TA2154A	1588.655	1.0	34.47	1.1X0.9	GPS+GLONASS+GALILEO+BEIDOU
TA2250A	1585.655	1.0	40.47	1.1X0.9	GPS+GLONASS+GALILEO+BEIDOU
TA2309A	1223	2.4	52	1.1X0.9	G3+L2+G2
TA2448A	1889	1.5	50	1.1X0.9	
TA2471A	1176.45	1.8	25	1.1X0.9	GPS L5
TA2542A	1582.47	1.2	46.84	1.1X0.9	GPS+GLONASS+GALILEO+BEIDOU
TA2543A	1176.45	1.4	20	1.1X0.9	GPS L5
TA2600A	1221.5	1.8	65	1.1X0.9	B2I+L2+G2
TA2637A	1207.5	1.9	83	1.1X0.9	L5+L2
TA2695AA1221	1238	3.0	82	1.1X0.9	E5B+B3
TA2796A	1575.42	1.2	30.69	1.1X0.9	QZSS L1
TA2797A	1228	2.0	20	1.1X0.9	GPS L2
TA2799A	1223	1.8	52	1.1X0.9	G3+L2+G2
TA2812AA1325	1203	2.6	74	1.1X0.9	GNSS L5+L2
TA1954EW1234*	1582.47	1.2	46.84	1.1X0.9	GPS+GLONASS+GALILEO+BEIDOU
TA2695BA1234*	1238	3.0	82	1.1X0.9	GNSS G3+B3I
TA2749AA1234*	1582.47	1.0	46.84	1.1X0.9	GPS+GLONASS+GALILEO+BEIDOU
TA2825AA1243	1567.75	2.0	46.84	1.1X0.9	GPS+GLONASS+BEIDOU

GNSS Single SAW Filter



*AEC-Q200 Confidential

TST P/N	Frequency (MHz)	Insertion Loss (dB)	Band Width (MHz)	Size (MM)	Note
TA0757B	1575.42	0.9	2	1.4x1.1	L1
TA2156A	1176.45	3.6	20	1.4x1.1	L5
TA2298A	1225	2.2	60	1.4x1.1	E5B+G2
TA2549A	1234.4	2.6	45	1.4x1.1	L2+G2
TA2550A	1191.8	2	55	1.4x1.1	L5+G3
TA2551A	1587.1	2.3	55	1.4x1.1	GNSS B1
TA2552A	1278.5	2	55	1.4x1.1	GNSS E6
TA2662A	1260	1.9	48	1.4x1.1	G2+B3
TA2663A	1202	2.4	73	1.4x1.1	L2+L5
TA2707AA1322	1575.42	1.7	2	1.4x1.1	L1
TA2724AA1325	1238	2.6	82	1.4x1.1	E5B+B3
TA2750AA1320	1582.47	0.9	46.84	1.4x1.1	GPS+GLONASS+GALILEO+BEIDOU
TA2780AA1310	1252.5	2.5	77	1.4x1.1	L2+E6
TA1343EA1334*	1583	1.2	46.79	1.4x1.1	GPS+GLONASS+GALILEO+BEIDOU
TA2714AA1334*	1202	2.6	72	1.4x1.1	GNSS L2+L5
TA2775A*	1176.45	1.4	20	1.4x1.1	GNSS L5
TA2782AA1334*	1583	1.3	46.79	1.4x1.1	GPS+GLONASS+GALILEO+BEIDOU
TA2812BA1334*	1203	1.3	74	1.4x1.1	GNSS L2+L5
TA2833AA1334*	1583	1.4	46.79	1.4x1.1	GPS+GLONASS+GALILEO+BEIDOU
TA2838AA1334*	1238	2.6	82	1.4x1.1	GNSS G3+B3I
TA2839AA1334*	1583	1.8	46.79	1.4x1.1	GPS+GLONASS+GALILEO+BEIDOU
TA2851AA1334*	1565.5	3.1	81	1.4x1.1	
TA2870AA1334*	1582.4	1.2	46.61	1.4x1.1	GPS+GLONASS+GALILEO+BEIDOU
TA2873AA1334*	1588.655	1.25	34.47	1.4x1.1	GNSS B1C+G1
TA2876AA1334*	1246.5	2.3	63	1.4x1.1	GNSS L2+B3
TA2878AA1334*	1260	1.9	48	1.4x1.1	GNSS G2+E6

GNSS Single SAW Filter



*AEC-Q200 Confidential

TST P/N	Frequency (MHz)	Insertion Loss (dB)	Band Width (MHz)	Size (MM)	Note
TA2493A	1176.5	1.9	20.44	3.0x3.0	GPS L5
TA2618A	1582.4	1.2	46.61	3.0x3.0	GPS+GLONASS+GALILEO+BEIDOU
TA2660A	1268.5	3	63	3.0x3.0	GPS+GLONASS+GALILEO+BEIDOU
TA0440A*	1575.42	2.9	2	3.0X3.0	GNSS L1
TA0675A*	1176.45	3.3	20	3.0X3.0	GNSS L5
TA0676A*	1592.5	2.6	43	3.0X3.0	
TA1106CA3114*	1209.5	3.6	87	3.0X3.0	GNSS L5+G2
TA1658A*	1582.4	1.7	46.61	3.0X3.0	GPS+GLONASS+GALILEO+BEIDOU
TA1785B*	1583	1.8	46.79	3.0X3.0	GPS+GLONASS+GALILEO+BEIDOU
TA1923A*	1587.1	2.4	55	3.0X3.0	GPS+GLONASS+GALILEO+BEIDOU
TA1925A*	1234.4	3.3	45	3.0X3.0	GNSS L2C+G2
TA1957A*	1278.75	2	55	3.0X3.0	GNSS E6
TA2247BA3114*	1565.5	3.1	81	3.0X3.0	
TA2248CA3114*	1223	3	54	3.0X3.0	GNSS E5b+G2
TA2670ATCA*	1575	2.5	70	3.0x3.0	GPS+GLONASS+GALILEO+BEIDOU
TA2884AW3114*	1567.5	2.5	85	3.0X3.0	

GNSS Dual SAW, Diplexer and Notch



*AEC-Q200 Confidential

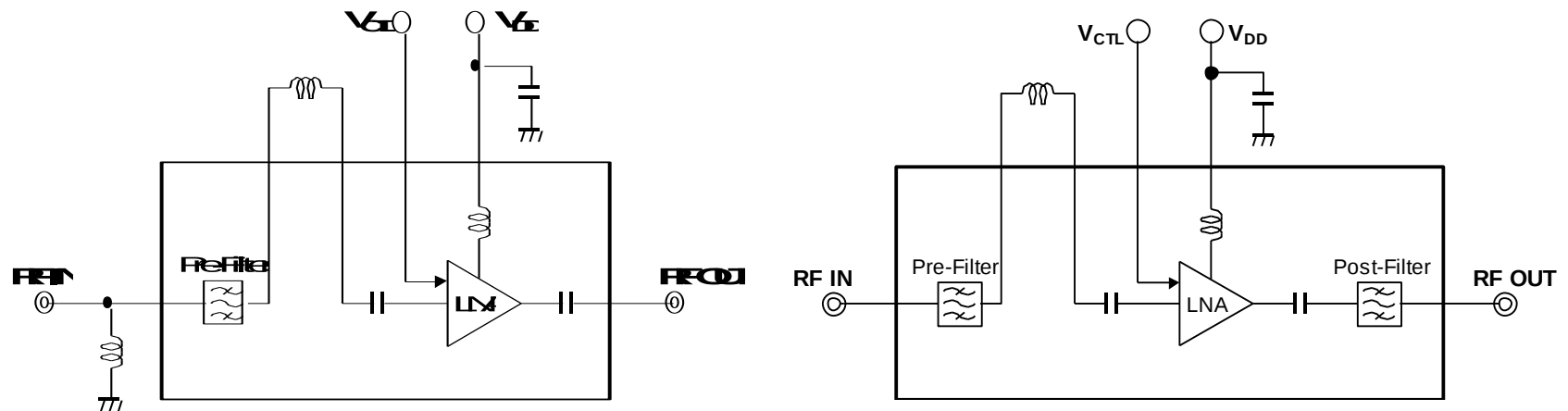
TST P/N	Center Freq. (MHz)	Bandwidth (MHz)	Package Size (mm)	Note
TE0133A *	1189/ 1582	50/47	3.0x3.0	GNSS L1/ L5(Diplexer)
TE0137A *	1223/1582	52/46	3.0x3.0	GNSS L1/ L2(Diplexer)
TE0149A	1176.45/1585.47	20.46/52.84	1.5x1.1	GNSS L1/ L5(Diplexer)
TE0149DA1534*	1176.45/1585.47	20.46/52.84	1.5x1.1	GNSS L1/ L5(Diplexer)
TE0150A	1222.5/1582.5	53/47	1.5x1.1	GNSS L1/ L2(Diplexer)
TE0150C *	1222.5/1582.5	53/47	1.5x1.1	GNSS L1/ L2(Diplexer)
TE0171AA1523	1197.5/1582.5	63/47	1.5x1.1	GNSS L1/ L2+L5(Diplexer)
TE0171BW1534*	1197.5/1582.5	63/47	1.5x1.1	GNSS L1/ L2+L5(Diplexer)
TE0191AA1533*	1176.45/1582.47	20.46/46.84	1.5x1.1	GNSS L1/ L5(Diplexer) New
TE0191A*	1176.45/1582.47	20.46/46.84	1.5x1.1	GNSS L1/ L5(Diplexer)
TE0123A *	1575.42	6	3.0x3.0	L1 GPS (Notch)
TE0125A *	1582.47	48	3.0X3.0	GPS+GLONASS+GALILEO+BEIDOU(Notch)
TE0142A *	1583	48	3.0X3.0	GPS+GLONASS+GALILEO+BEIDOU(Notch)

*** AEC-Q200**

TCXO P/N	Center Freq. (MHz)	Freq stability (ppm)	Package Size (mm)	Note
TX0765FA13BP	37.4	0.5	1.6X1.2	Ublox
TX0408A	26	0.5	2.0x1.6	
TX0763B	52	0.5	2.0x1.6	
TX0395B	26	0.5	2.5x2.0	MediaTek, MT33xx,
TX0275A	16.368	0.5	3.2x2.5	Trimble
TX0306A	16.367667	0.5	2.5x2.0	Skytraq V6

GPS Front End Module

TST P/N	Center Freq. (MHz)	Bandwidth (MHz)	I/O Impedance	Package Size (mm)	Note
TN0081B*	1582.47	46.84	50/50 Ω	2.5X2.5	GPS+GLONASS+GALILEO+BEIDOU
TN0089A*	1582.47	46.84	50/50 Ω	1.5X1.1	GPS+GLONASS+GALILEO+BEIDOU
TN0175BA1584*	1221.5	65	50/50 Ω	1.5X1.1	GNSS L5/E5/B2/G3/L2C
TN0201A*	1189.5	51	50/50 Ω	1.5X1.1	GNSS L5+G3
TN0222A*	1176.45	25	50/50 Ω	1.5X1.1	GNSS L5
TN0267AA0084	1195.8	63.6	50/50 Ω	1.5X1.1	GNSS L5/E5/B2/G3/L2C New



GPS FEM

TST SAW Business Unit

Products & Technology

2.4G/5G WiFi Application



2.4G WiFi solution - Single SAW/BAW Filter



*AEC-Q200 Confidential

TST P/N	Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB)	Size (MM)	Note
TA2104A	2441.75	83.5	2.2	1.1X0.9	
TA2104BTCA	2441.75	83.5	1.7	1.1X0.9	TC SAW
TA2530A	2442	79	1	1.1x0.9	High performance SAW
TA2530B*	2442	79	1	1.1x0.9	High performance SAW AEC-Q200
TA2545ATCA	2441.75	83.5	1.7	1.1x0.9	TC SAW
TA2603A	2442	82	2.3	1.1x0.9	
TA2620A	2442	79	1.7	1.1x0.9	
TA2621A	2442	79	0.9	1.1x0.9	BAW , WiFi/LTE co-existence
TA2621B*	2442	79	0.9	1.1x0.9	BAW , AEC-Q200
TA2702AA1221	2442	84	3	1.1x0.9	
TA2795AA1225	2442	79	2	1.1x0.9	
TA2823AA1252	2442	79	2.3	1.1x0.9	TC SAW
TA1218A	2436	72	3	1.4x1.1	
TA1629A	2450	100	1.6	1.4x1.1	
TA2269A	2441.75	83.5	2.2	1.4x1.1	
TA2269B	2441.75	83.5	1.5	1.4x1.1	TC SAW
TA2602A	2442	82	2.1	1.4x1.1	
TA2604B	2442	84	2.3	1.4x1.1	
TA2885AW1334	2441.75	83.5	2.2	1.4x1.1	
TA0222A*	2442	55	1.9	3.0x3.0	AEC-Q200
TA0223A*	2441.8	83.5	2.1	3.0x3.0	AEC-Q200
TA0532A*	2441.8	83.5	2.1	3.0x3.0	AEC-Q200
TE0166A	2442	83.5	0.8	1.4x1.1	Notch filter
TE0187A*	2442	83.5	1.2	1.4x1.1	Notch filter, AEC-Q200

5G WiFi solution- Single BAW Filter

Part Number	Center Freq. (MHz)	BW(MHz)	Insertion Loss (dB)	Package Size (mm)	Note
TA2580ABAWA	5250	160	1.8	2.5x2.0	5.2G WLAN
TA2586ABAWA	5665	345	2.3	2.5x2.0	5.6G WLAN
TA2589ABAWA	5775	100	2.5	2.5x2.0	5.7G WLAN
TK0005AA2862	4850	100	2.0	2.5x2.0	5G n79 band
TK0006AA2862	3450	300	1.5	2.5x2.0	5G n78/77 band
TK0003AA2862	3500	200	1.5	2.5x2.0	5G n78/77 band and 4G B42
TK0004AA2862	3575	250	1.5	2.5x2.0	5G B48 (CBRS)
TK0009AA2862	5250	160	2.1	2.5x2.0	5.2GHz WiFi
TK0010AA2862	5665	345	2.7	2.5x2.0	5.6GHz WiFi

WiFi Solution – Xtal

WiFi IC	Chips P/N	TST P/N	Status
Qualcomm	Hasting prime 2/WCN6851	TZ3770AAAI82 (76.8M/1210)	On BOM
Qualcomm	Hasting /QCA639X /QCA638X	TZ3465A (48MHz 1210)	On BOM
Qualcomm	CSR/QCC5141	TZ3484C(32M/1612)	On BOM
Qualcomm	QCC5161	TZ3484COAI62 (32M/1612)	On BOM
Silabs	EFR/M32	TZ2205E(38.4 2016)	On BOM
Silabs	EFR/M32	TZ0909E (38.4 2520)	On BOM
Silabs	EFR/M32	TZ3398B (38.4 2016)	On BOM
TI	Agama (CC2652P, CC2652R)	TZ3780AAAO44 (48M, 2016, 105C)	On BOM
TI	WL1807	TX0857EAAO52 (26M/2016)	On BOM
TI	WL1807	TX0889BCAO54(26M/2016)	On BOM
MTK	MT7668	TZ3096B (40M/3225)	On BOM
MTK	MT7663	TZ3450D(25M/3225)	On BOM
MTK	MT7663	TZ3146E(26M/3225)	On BOM
MTK	MT7629/ 26	TZ3096B (40M/3225)	On BOM
MTK	MT2523/2533/28XX	TZ3126A (26M/1612)	On BOM
MTK	MT7922	TZ3788AA2282 (40M/ 1210) ,TZ2965C (40M/ 2520)	On BOM
MTK	MT7921	TZ1379BA2212 (40M/ 3225),TZ2965C (40M/ 2520)	On BOM
MTK	MT7933	TZ3569B(26M /2520)	On BOM
Realtek	RTL8721D	TZ2771D (40M/3225)	On BOM
Realtek	RTL8722D	TZ3141A (40M/2520)	On BOM
Realtek	RTL8720D	TZ2762B (40M/2016)	On BOM
Realtek	RTL8752C/ 62C	TZ0882D (40M/3225)	On BOM
Realtek	RTL8752C/ 62C	TZ1181B (40M/2520)	On BOM
Realtek	RTL8752C/ 62C	TZ0308D (40M/3225)	On BOM
Realtek	RTL8752C/ 62C	TZ0733E (40M/2520)	On BOM
Realtek	RTL8752C/ 62C	TZ1166B(32.768/3215)	On BOM
Realtek	RTL8725	TZ3405C (40M/2016)	On BOM
Realtek	RTL8852A	TZ3405D (40M/2016)	On BOM
Realtek	RTLxxxx Ameba	TZ2328BOAK43 (26M/2016)	On BOM
Realtek	RTLxxxx Ameba	TZ3146BOAK13(26M/3225)	On BOM
Realtek	RTLxxxx Ameba	TZ3405COAK43(40M/2016)	On BOM

TST SAW Business Unit Products & Technology

Digital Radio (SDARS) Application

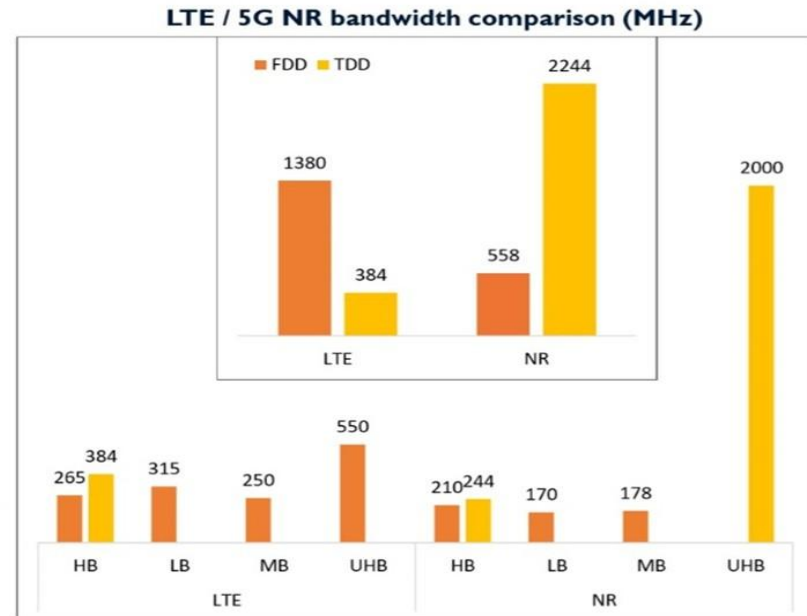
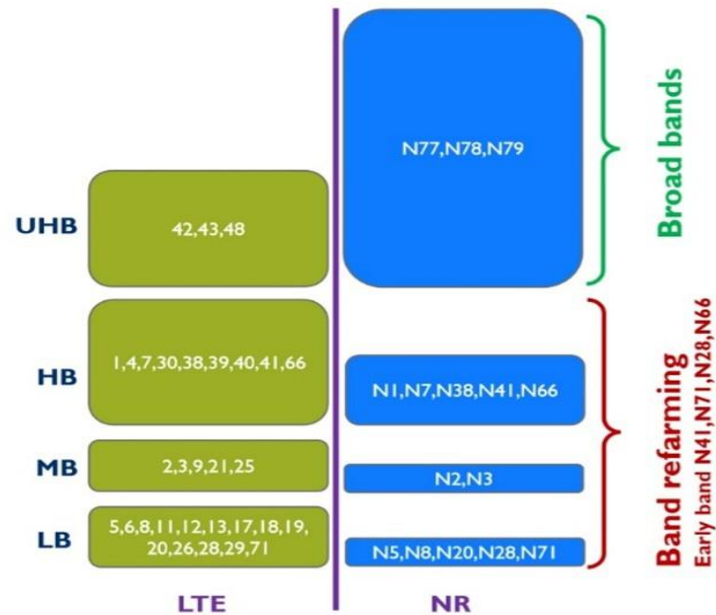


TST P/N	Center Freq. (MHz)	Bandwidth (MHz)	Insertion Loss (dB)	Package Size (mm)	Note
TA2379A	2332.5	25	1.7	1.1X0.9	High Atten, Balanced Type, RF360 AT36A
TA2392A	2332.5	25	3.1	1.1X0.9	
TA2392ATCA	2332.5	25	3.1	1.1X0.9	TC SAW
TA2393A	2338.75	25	0.35	1.1X0.9	Low Loss type
TA2568A	2332.5	25	1.6	1.1X0.9	Balanced Type
TA1040A*	2338.75	12.5	2.6	1.4X1.1	Hermetic CSP
TA1462A	2338.75	12.5	2.6	1.4X1.1	
TA1492A	2332.5	25	1.9	1.4X1.1	
TA2916AA1532*	2332.5	25	3.9	1.5x1.1	Qorvo 885216 New
TA0273A	2332.5	25	2.1	3X3	
TA0803A	2313.5	27	2.4	3X3	
TA0803B*	2313.5	27	2.4	3X3	AECQ
TA1282A	2332.5	25	2.7	3X3	EPCOS B3595
TA1377A	2338.75	12.5	2.1	3X3	Balanced Type, EPCOS B1644
TA1657A	2332.5	25	0.6	3X3	Low loss EPCOS B3416
TA2231A	2332.5	25	0.6	3X3	High Atten, Balanced Type, B3416
TA2591ATCA*	2332.5	25	2.9	3X3	TC SAW
TA2610A*	2332.5	25	0.4	3X3	Low loss
TE0165A	2332.5	25	1.1	1.4x1.1	SAW band stop filter

TST SAW Business Unit Products & Technology



5G / 4G LTE



LTE solution-Single SAW filter



*AEC-Q200 Confidential

LTE band	TST P/N	Frequency (MHz)	Band Width (MHz)	Size (MM)	Note
Band 1	TA1845A/ TA1845B*/ TA1845D	2140	60	1.1X0.9	Rx
	TA1699A				Rx, balanced type
	TA1815A/TA1815B*/TA1815D	1950	60	1.1X0.9	Tx
Band 2	TA1870A/TA1870B*/TA1870D	1960	60	1.1X0.9	Rx
	TA1950A/TA1950D				Rx, balanced type
	TA1871A/TA1871B*	1880	60	1.1X0.9	Tx
Band 3	TA1843A/TA1843B*/TA1843D	1842.5	75	1.1X0.9	Rx
	TA1857A/TA1857D				Rx, balanced type
	TA1885A/TA1885B*	1747.5	75	1.1X0.9	Tx
Band 4	TA1845A/ TA1845B*/ TA1845D	2132.5	45	1.1X0.9	Rx
	TA1699A				Rx, balanced type
	TA1872A/TA1872B*	1732.5	45	1.1X0.9	Tx
Band 5	TA1811A/TA1811B*/TA1811D	881.5	25	1.1X0.9	Rx
	TA1690D				Rx, balanced type
	TA1692A/TA1692B*/TA1692D	836.5	25	1.1X0.9	Tx
Band 7	TA1847A/TA1847B*/D/TA1847D	2655	70	1.1X0.9	Rx
	TA2130D				Rx, balanced type
	TA1886A	2535	70	1.1X0.9	Tx
Band 8	TA1839A/TA1839B*/TA1839D	942.5	35	1.1X0.9	Rx
	TA1743D				Rx, balanced type
	TA1814A/TA1814B*	897.5	35	1.1X0.9	Tx
Band 12	TA2037A/TA2037B*	737.5	17	1.1X0.9	Rx
	TA1949A				Rx, balanced type
	TA2438A/TA2438B*	707.5	17	1.1X0.9	Tx
Band 13	TA2062A/TA2062B*	751	10	1.1X0.9	Rx
	TA2622A				Rx, balanced type
	TA1813A/TA1813B*	782	10	1.1X0.9	Tx

LTE solution-Single SAW filter



*AEC-Q200 Confidential

LTE band	TST P/N	Frequency (MHz)	Band Width (MHz)	Size (MM)	Note
Band 14	TA2509A/TA2509B*	763	10	1.1X0.9	Rx
Band 17	TA2037A/TA2037B*	737.5	17	1.1X0.9	Rx
	TA2439A/TA2439B*	710	12	1.1X0.9	Tx
Band 19	TA1811A/TA1811B*/TA1811D	882.5	15	1.1X0.9	Rx
	TA1690D		15		Rx, balanced type
	TA1692A/TA1692B*/TA1692D	837.5	15	1.1X0.9	Tx
Band 20	TA2041A/TA2041B*	806	30	1.1X0.9	Rx
	TA2042A(Band 20 Tx)	847	30	1.1X0.9	Tx
Band 26	TA2016A/TA2752AW1234*	876.5	3.6	1.1X0.9	Rx
	TA2069A	876.5	3.6	1.1X0.9	Rx, balanced type
Band 28F	TA2394A	780.5	45	1.1X0.9	Rx
Band 28A	TA1897A/TA1897C*	773	30	1.1X0.9	Rx
Band 28B	TA1898A/TA1898B*	788	30	1.1X0.9	Rx
Band 29	TA2575A	722.5	11	1.1X0.9	Rx
Band 30	TA2574A	2355	10	1.1X0.9	Rx
Band 38	TA1968A/TA1965A	2595	50	1.1X0.9	Rx
Band 39	TA2018A/TA2766BA1233*	1900	40	1.1X0.9	Rx
Band 40	TA1966A/TA1969A/TK0021AW1234*	2350	100	1.1X0.9	Rx
Band 41	TA2819AA1260/TA2871AA0034*	2593	194	1.1X0.9	Rx New
Band 66	TA2473A/TA2473B*	2155	69.04	1.1X0.9	Rx

LTE solution-1612/1814 Duplexer



*AEC-Q200 Confidential

LTE band	TST P/N	Frequency (MHz)	Band Width (MHz)	Size (MM)	Note
Band 1	TF0228AA0033	1950/2140	60	1.6x1.2	
Band 2	TF0219AA0031	1880/1960	59.5	1.6x1.2	
Band 3	TF0229AA0033	1747.5/1842.5	74.7	1.6x1.2	
Band 5	TF0226AA0033	836.5/881.	25	1.6x1.2	
Band 7	TF0218AA0031	2535/2655	70	1.6x1.2	
Band 8	TF0227AA0033	897.5/942.5	34.7	1.6x1.2	
Band 66	TF0232AA0031	1745/2155	69.7/89.7	1.6x1.2	New
Band 1	TF0120C*/TF0120DA TF0126A/TF0126DA	1950/2140	60	1.8x1.4	Balanced type
Band 2	TF0121A/TF0121B* TF0127A	1880/1960	59.04	1.8x1.4	Balanced type
Band 3	TF0135A/TF0135B*	1747.5/1842.5	74.7	1.8x1.4	
Band 4	TF0122A/TF0122B* TF0128A	1732.5/2132.5	45	1.8x1.4	Balanced type
Band 5	TF0123B*/TF0123D TF0129A	836.5/881.5	25	1.8x1.4	Balanced type
Band 7	TF0124A/TF0124C*	2535/2655	70	1.8x1.4	
Band 8	TF0125B*/TF0125D TF0130A	897.5/942.4	30.2	1.8x1.4	Balanced type
Band 12	TF0133A/TF0133B*	707.5/737.5	17	1.8x1.4	
Band 13	TF0169A/TF0169B*	751/782	51	1.8x1.4	
Band 14	TF0193A/TF0193B*	763/793	10	1.8x1.4	
Band 20	TF0168A/TF0168B*	806/847	29.5	1.8x1.4	
Band 25	TF0136A/TF0136B*	1882.5/1962.5	65	1.8x1.4	
Band 26	TF0137A/TF0137B*	831.5/876.5	34.52	1.8x1.4	
Band 28A	TF0155A/TF0155B*	718/773	30	1.8x1.4	
Band 28B	TF0159A/TF0159B*	733/788	30	1.8x1.4	
Band 66	TF0167A/TF0167B*	1745/2155	69.04	1.8x1.4	

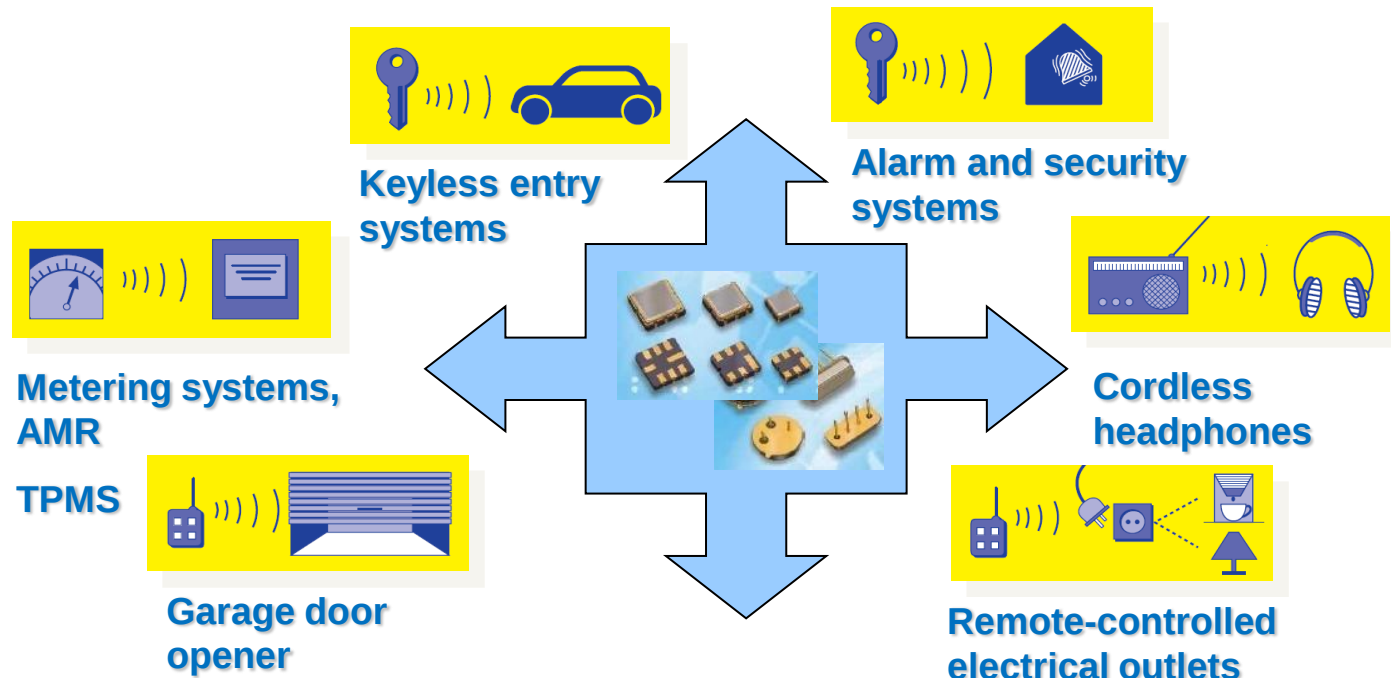
LTE solution-Tri/Quadplexer

Type	TST P/N	Frequency (MHz)	Band Width (MHz)	Size (MM)	Note
Triplexer	TE0190AA1833	1842.5/2140/2655	75/60/70	1.8x1.4	B3+B1+B7
Quadplexer	TF0233AA2722	1747/1842 1950/2140	75/75 60/60	2.5x2.0	B1-Tx + B1-Rx B3-Tx + B3-Rx

New

TST SAW Business Unit Products & Technology

Remote Keyless Entry,
ISM Band, Meter
Automotive Application



TST P/N	Frequency (MHz)	Insertion Loss (dB)	Band Width (MHz)	Size (MM)
TA1629A	2450	1.6	100	1.4x1.1
TA2483A	2450	1.6	100	3.0x3.0
TA2621A	2442	0.9	79	1.1x0.9
TA2604B	2442	2.3	84	1.4x1.1
TA0222A	2442	1.9	55	3.0x3.0
TA0223A	2441.8	2.1	83.5	3.0x3.0
TA2104A	2441.75	2.2	83.5	1.4x1.1
TA2269A	2441.75	2.2	84	1.4x1.1
TA2294A	915	1.9	26	1.1x0.9
TA1294A	915	2.5	26	1.4x1.1
TA1423A	915	1.9	26	1.4x1.1
TA2897AW1334	915	1.9	26	1.4x1.1
TA0281A	915	2.2	26	3.0x3.0
TA1561A	915	1.9	26	3.0x3.0
TA1457A	869.6	2.4	1	3.0x3.0
TA1946A	869	2.5	2	1.4x1.1
TA2093A	869	3	2	1.4x1.1
TA1404A	869	2.3	2	3.0x3.0
TA2532A	869	1.9	8	3.0x3.0
TA0659A	868.3	2.9	1.5	3.0x3.0
TA0547A	867.5	1.8	6	3.0x3.0
TA0801A	866.5	2.3	7	3.0x3.0
TA2590A	840.8	2.3	1.5	3.0x3.0
TA0944A	433.92	1.6	1.6	3.0x3.0
TA1565A	433.92	2.4	0.3	3.0x3.0
TA0657A	315	1.5	0.6	3.0x3.0
TA1564A	315	2.1	0.36	3.0x3.0

Center Freq. (MHz)	Part Number	Tolerance (KHz)	Package Size (mm)
314.68	TC0661A	+/-100	3.0x3.0
315	TC0274AW3114	+/-40	3.0x3.0
315	TC0437A	+/-75	5.0X3.5
315	TC315GD-A	+/-75	5.0x5.0
403.55	TC0272A	+/-75	3.0x3.0
433.92	TC0219C	+/-50	3.0x3.0
433.92	TC0219A	+/-75	3.0x3.0
433.92	TC0170A	+/-75	3.8X3.8
433.92	TC0269A	+/-75	5.0X3.5
491.52	TC0675AA3112	+/-50	3.0x3.0
390	TC0150A	+/-75	5.0x5.0
800	TC0627A	+/-75	3.0x3.0
868.35	TC0331A	+/-100	3.0x3.0
868.35	TC0331B	+/-75	3.0x3.0
868.35	TC0196A	+/-75	5.0x5.0
868.95	TC0322A	+/-100	3.0x3.0
915	TC0278A	+/-100	3.8X3.8
1000	TC0528A	+/-125	3.0x3.0
1000	TC0337A	+/-50	3.8X3.8
1033.333	TC0556A	+/-50	3.8X3.8
1073.817	TC0598A	+/-125	3.0x3.0
1090	TC0514A	+/-50	3.0x3.0
1500.1	TC0672A	+/-200	3.0x3.0

BLT / .11ah IC	Chips P/N	TST Xtal P/N	Status
Qualcomm	CSR/QCC5141	TZ3484C(32M/1612)	On BOM
Qualcomm	QCC5161	TZ3484COAI62 (32M/1612)	On BOM
Silabs	EFR32ZG14 (new chip) EFR32ZG13	TZ2205E (38.4M/2016)	On BOM
Silabs	EFR32ZG14 (new chip) EFR32ZG13	TZ0909E (38.4M/2520)	On BOM
Silabs	EFR32ZG14 (new chip) EFR32ZG13	TZ2528C (32.768K/2012)	On BOM
TI	Agama (CC2652P, CC2652R)	TZ3780AAAO44 (48M, 2016, 105C)	On BOM
TI	Agama (CC2652P, CC2652R)	TZ3359CAAO74 (32.768, 1610, 105C)	On BOM
TI	CC13x2, CC26x2	TZ1166C (32.768, 3215),TZ2365C (48, 2016)	On BOM
Cypress	CYW20819/20820 Automotive	TZ3406A (32.768K/2012)	On BOM
Cypress	CYW20819/20820 Automotive	TZ2612C (24Mhz/3225)	On BOM
Cypress/Infineon	CYW920835	TZ3261B (24M/2016)	on BOM
Cypress/Infineon	CYW920835	TZ3406A (32.768K /2012)	on BOM
MTK	MT2523/2533/28XX	TZ3126A (26M/1612)	On BOM
MTK	MT7922	TZ3788AA2282 (40M/ 1210) TZ2965C (40M/ 2520)	On BOM
MTK	MT7921	TZ1379BA2212 (40M/ 3225),TZ2965C (40M/ 2520)	On BOM
MTK	MT7933	TZ3569B (26M/2520)	On BOM
Airoha	MT2621 (MT2625+MT6261)	TZ2719B (26M/ 2520)	On BOM
Realtek	RTL8752C/ 62C	TZ1181B (40M/2520)	On BOM
Realtek	RTL8752C/ 62C	TZ0733E (40M/2520)	On BOM
Realtek	RTL8752C/ 62C	TZ1166B(32.768/3215)	On BOM
Dialog	DA14690	TZ3484 (32M/1612)	On BOM
Dialog	DA14531/D2632 Module	TZ3375C (32M/2016)	On BOM
NXP	NxH2003	TZ3525A (32M/1210)	On BOM
Microchip	SAMR30-XPRO board	TZ1670B (16M/2520)	On BOM
Microchip	R30_LoRa	TZ2486E (16M/2016)	On BOM
Microchip	BT/IS208x	TZ3077C (16M/3225)	On BOM
Microchip	Rio2	TZ3405F (40M/2016)	On BOM

TST SAW Business Unit Products & Technology

LTCC Filter for WiFi, 4G LTE, IOT Application

TST P/N	Fc(MHz)	PB(MHz)	BW (MHz)	IL(dB)	Att.(dB)	Size (mm)	Application
TL0001A	3550	3300~3800	500	1.3 Max	≥ 20 dB @2600MHz	1.6X0.8	LTE Band 42/43
TL0010A	2450	2400~2500	100	2.2 Max	≥ 30 dB @880~915MHz ≥ 30 dB @1710~1785MHz ≥ 25 dB @1850~1910MHz ≥ 25 dB @4800~5000MHz ≥ 15 dB @7200~7500MHz	1.6X0.8	2.4G Wi-Fi
TL0011A	5410	4900 ~ 5920	1050	2.0 Max	≥ 30 dB @3500MHz	2.0X1.25	5G Wi-Fi
TL0015A	829.5	699~960	261	0.7 Max	≥ 30 dB @1427~1920MHz ≥ 30 dB @2097~2880MHz	1.6X0.8	NB-IOT
TL0016A	1850	1710~1990	280	0.6 Max	≥ 30.5 dB @3420~3980MHz	1.6X0.8	NB-IOT
TL0017B	2450/5500	2400 ~ 2500 5150 ~ 5850	100/700	0.6Max @ 2400 ~ 2500MHz 1.5Max @ 5150 ~ 5850MHz	≥ 23 dB @4800~5000MHz ≥ 30 dB @7200~7500MHz ≥ 25 dB @240~2500MHz ≥ 15 dB @ 3400~3600MHz ≥ 10 dB @3600~3900MHz ≥ 20 dB @6900~7550MHz ≥ 30 dB @10600~11700MHz ≥ 20 dB @15300~16200MHz	1.6X0.8	WiFi+Combo Modules
TL0019A	5788	5725 ~ 5850	125	2.4 Max	≥ 50 dB @1908~1950MHz ≥ 47 dB @3816~3900MHz ≥ 25 dB @11450~11700MHz	2.5X2.0	5G Wi-Fi (V2X)
TL0019B	5788	5725 ~ 5850	125	2.4 Max	≥ 50 dB @1908~1950MHz ≥ 47 dB @3816~3900MHz ≥ 25 dB @11450~11700MHz	2.5X2.0	V2X
TL0020A	915	902 ~ 928	26	0.7 Max	≥ 30 dB @1804 ~ 1856MHz ≥ 30 dB @2706~2784MHz	2.0x1.25	LTE, IOT
TL0022A	205.5	174 ~ 237	63	1.6Max	≥ 10 dB @ 100MHz ≥ 20 dB @ 500MHz ≥ 25 dB @ 1452 ~ 1492MHz	3.2X2.5	

TST P/N	Fc(MHz)	PB(MHz)	BW (MHz)	IL(dB)	Att.(dB)	Size (mm)	Application
TL0023A	902.5	890 ~ 915	25	0.75 Max	≥ 30 dB @1780 ~ 1830MHz ≥ 30 dB @2670 ~ 2745MHz	2.0x1.25	LTE, IOT
TL0024A	2450	1870~3030	1160	0.7Max	≥ 25 dB @902~928MHz ≥ 30 dB @4800~7500MHz	2.0X1.25	Bluetooth, Wireless LAN
TL0025A	2448	2412~2484	72	1.55Max	≥ 20 dB @1608~1656MHz ≥ 30 dB @3216~3312MHz	2.0X1.25	Bluetooth, Wireless LAN
TL0026A	869.5	824~915	91	0.7 Max	≥ 20 dB@2400~2750MHz	0.65X0.5	GSM Band RF Application
TL0027A	869.5	824~915	91	0.85 Max	≥ 25 dB @1648~1830MHz ≥ 25 dB @2472~2745MHz ≥ 25 dB @3296~3660MHz	1.0X0.5	GSM Band RF Application
TL0029A	2200	1700~2700	1000	1.05 Max	≥ 20 dB @3400MHz ≥ 22 dB @3400~5400MHz ≥ 25 dB @5400~8100MHz	1.6X0.8	WiFi
TL0030A	1867.5	1710~2025	315	1.6 Max	≥ 20 dB @2400~2500MHz ≥ 25 dB @3760~4050MHz ≥ 25 dB @5150~5850MHz ≥ 25 dB @ 5640~6075MHz	1.0X0.5	1.8 GHz DCS/ PCS Band RF Application
TL0031A	1952.5	1880~2025	145	1.6 Max	≥ 20 dB @2400~2500MHz ≥ 25 dB @3760~4050MHz ≥ 25 dB @5150~5850MHz ≥ 22 dB @ 5640~6075MHz	1.0X0.5	WiFi
TL0032A	5887.5	5850~5925	75	3.5 Max	≥ 50 dB@1908~1950MHz ≥ 47 dB@3816~3900MHz ≥ 25 dB @11450~11700MHz	2.5X2.0	V2X
TL0032B	5887.5	5850 ~ 5925	75	2.2Max	≥ 50 dB @ 1908 ~ 1950MHz ≥ 47 dB @ 3816 ~ 3900MHz ≥ 25 dB @ 11450 ~ 11700MHz	2.5x2.0	Wave Module
TL0032DA2592	5887.5	5850 ~ 5925	75	2.2Max	≥ 50 dB @ 1908 ~ 1950MHz ≥ 47 dB @ 3816 ~ 3900MHz ≥ 25 dB @ 11450 ~ 11700MHz	2.5x2.0	Networking

TST P/N	Fc(MHz)	PB(MHz)	BW (MHz)	IL(dB)	Att.(dB)	Size (mm)	Application
TL0033A	3600	3400~3800	400	1.7 Max	≥ 38 dB @ 698 ~ 2170MHz ≥ 28 dB @ 2300 ~ 2700MHz ≥ 30 dB @ 4900 ~ 5850MHz	2.0x1.25	LTE Band 42/43
TL0034A	915	902 ~ 928	26	0.5 Max	≥ 30 dB @1830MHz ≥ 30 dB @2745MHz	2.0x1.25	LTE, IOT
TL0035A	5788	5725 ~ 5850	125	1.5 Max	≥ 50 dB @824~1910MHz ≥ 15 dB @9880~11700MHz	2.5X2.0	5G Wi-Fi (V2X)
TL0035B	5788	5725.5 ~ 5850.5	125	1.5Max	≥ 50 dB @ 824 ~ 1910MHz ≥ 15 dB @ 9880 ~ 11700MHz	2.5x2.0	
TL0036A	2450	2400 ~ 2500	100	1.5Max		1.6x0.8	WiFi
TL0037A	3750	3300~4200	900	2.25 Max	≥ 38 dB @ 2300~2483 MHz ≥ 33 dB @ 2496~2690 MHz ≥ 25 dB @ 5150~5850 MHz	2.0X1.25	5G N77
TL0038A	4700	4400~5000	600	2.3 Max	≥ 33 dB @ 2496~2690 MHz ≥ 15 dB @ 5490~5670 MHz ≥ 25 dB @ 5670~5950 MHz	2.0X1.25	5G N79
TL0040A	5550	5150 ~ 5950	800	1.2Max	≥ 40 dB @ 30 ~ 2700MHz ≥ 35 dB @ 3400 ~ 3800MHz ≥ 20 dB @ 6900MHz ≥ 18 dB @ 7250 ~ 7800MHz ≥ 20 dB @ 10300 ~ 11700MHz	1.6x0.8	GNSS L5
TL0041AA0094	2450/ 5424	2400 ~ 2500 4900 ~ 5950	100/1050	0.9Max @ 2400 ~ 2500MHz 1.1Max @ 4900 ~ 5950MHz	≥ 17 dB @ 700 ~ 1300MHz ≥ 25 dB @ 4800 ~ 5000MHz ≥ 27 dB @ 7200 ~ 7500MHz ≥ 25 dB @ 1200 ~ 1500MHz ≥ 26 dB @ 1600 ~ 2000MHz ≥ 25 dB @ 2300 ~ 3000MHz ≥ 28 dB @ 10000 ~ 12000MHz ≥ 20 dB @ 15000 ~ 16500MHz ≥ 10 dB @ 16500 ~ 18000MHz	1.6x0.8	Networking

TST P/N	Fc(MHz)	PB(MHz)	BW (MHz)	IL(dB)	Att.(dB)	Size (mm)	Application
TL0041BA1695	2450/ 5424	2400 ~ 2500 4900 ~ 5950	100/1050	0.6Max @ 2400 ~ 2500MHz 0.9Max @ 4900 ~ 5950MHz	$\geq 25\text{dB @ } 4800 \sim 5000\text{MHz}$ $\geq 25\text{dB @ } 7200 \sim 7500\text{MHz}$ $\geq 27\text{dB @ } 1200 \sim 1500\text{MHz}$ $\geq 26\text{dB @ } 1500 \sim 2000\text{MHz}$ $\geq 20\text{dB @ } 2300 \sim 2700\text{MHz}$ $\geq 15\text{dB @ } 9800 \sim 11900\text{MHz}$	1.6x0.8	Networking
TL0042A	2450/ 5425	2400 ~ 2500 4900 ~ 5950	100/1050	0.55Max @ 2400 ~ 2500MHz 0.7Max @ 4900 ~ 5950MHz	$\geq 20\text{dB @ } 4800 \sim 5000\text{MHz}$ $\geq 22\text{dB @ } 5000 \sim 5950\text{MHz}$ $\geq 20\text{dB @ } 7200 \sim 7500\text{MHz}$ $\geq 26\text{dB @ } 824 \sim 2170\text{MHz}$ $\geq 30\text{dB @ } 2400 \sim 2500\text{MHz}$ $\geq 25\text{dB @ } 9800 \sim 11900\text{MHz}$	1.6x0.8	Networking
TL0043AA2095	2450	2400 ~ 2500	100	4.0Max	$\geq 35\text{ dB @ } 880 \sim 960\text{MHz}$ $\geq 30\text{ dB @ } 1710 \sim 1880\text{MHz}$ $\geq 20\text{ dB @ } 1880 \sim 1990\text{MHz}$ $\geq 30\text{ dB @ } 4800 \sim 5000\text{MHz}$	2.0x1.25	WiFi
TL0044AA0090	2050	1900 ~ 2200	300	3.5Max	$\geq 21\text{ dB @ } 2300 \sim 2500\text{MHz}$ $\geq 22\text{ dB @ } 2520 \sim 2820\text{MHz}$ $\geq 22\text{ dB @ } 3140 \sim 3400\text{MHz}$ $\geq 25\text{ dB @ } 3600 \sim 3900\text{MHz}$	3.2x2.5	non-disclose
TL0045AA0090	2058.5/ 3750/ 5537.5	1427~2690 3300~4200 5105~5925	1263/900/77 5	0.95Max 1.41Max 0.75Max	$21\text{ dB @ } 3300 \sim 3700\text{MHz}$ $32\text{ dB @ } 4950 \sim 5150\text{MHz}$ $25\text{ dB @ } 10300 \sim 11850\text{MHz}$	2.5x2.0	5G Home Router
TL0046AA0092	5550	5150 ~ 5950	800	1.05Max	$\geq 40\text{ dB @ } 30 \sim 27000\text{MHz}$ $\geq 35\text{ dB @ } 3400 \sim 3800\text{MHz}$ $\geq 20\text{ dB @ } 6900\text{MHz}$ $\geq 18\text{ dB @ } 7250 \sim 7800\text{MHz}$ $\geq 20\text{ dB @ } 10300 \sim 11700\text{MHz}$	1.6x0.8	Networking
TL0047A	2450	2400 ~ 2500	100	1.6Max	$\geq 30\text{ dB @ } 824 \sim 960\text{MHz}$ $\geq 30\text{ dB @ } 1710 \sim 1910\text{MHz}$ $\geq 20\text{ dB @ } 1920 \sim 1990\text{MHz}$ $\geq 6\text{ dB @ } 2110 \sim 2170\text{MHz}$ $\geq 20\text{ dB @ } 4800 \sim 5000\text{MHz}$	2.0x1.25	IOT

TST P/N	Fc(MHz)	PB(MHz)	BW (MHz)	IL(dB)	Att.(dB)	Size (mm)	Application
TL0049AA0093	7240	6240 ~ 8240	2000	2.5Max	≥ 35 dB @ DC ~ 5200MHz ≥ 35 dB @ 2400 ~ 2500MHz ≥ 15 dB @ 5200 ~ 5860MHz ≥ 10 dB @ 9000 ~ 9500MHz ≥ 30 dB @ 9500 ~ 18000MHz	2.0x1.25	UWB
TL0050AA0090	1653.5/ 4625	617 ~ 2690 3400 ~ 5850	2073/2450	1.05Max @ 617 ~ 2690MHz 1.4Max @ 3400 ~ 5850MHz	≥ 15 dB @ 3300 ~ 3400MHz ≥ 21 dB @ 3400 ~ 3800MHz ≥ 28 dB @ 5150 ~ 5925MHz ≥ 29 dB @ 617~ 960MHz ≥ 27 dB @ 1427 ~ 1511MHz ≥ 22 dB @ 1710 ~ 2690MHz ≥ 15 dB @ 10300 ~ 11700MHz ≥ 5 dB @ 15450 ~ 17550MHz	2.5x2.0	WiFi
TL0051AA0090	5425	4900 ~ 5950	1050	2.3Max	≥ 50 dB @ 50 ~ 110MHz ≥ 39 dB @ 700 ~ 1000MHz ≥ 29 dB @ 1280 ~ 3300MHz ≥ 39 dB @ 2400~ 2500MHz ≥ 20 dB @ 3300 ~ 4000MHz ≥ 9 dB @ 9800 ~ 11900MHz	1.6x0.8	WiFi
TL0052AA1695	680/ 2132.5	400 ~ 960 1575 ~ 2690	560/1115	1.0Max @ 400 ~ 960MHz 1.0Max @ 1575 ~ 2690MHz	≥ 20 dB @ 1575MHz ≥ 27 dB @ 1710 ~ 2690MHz ≥ 23 dB @ 400MHz ≥ 22 dB @ 698~ 960MHz ≥ 10 dB @ 5150 ~ 5850MHz	1.6x0.8	LTE