



SAW Components

SAW Rx 2in1 input duplex filter

GSM1900 / GSM1800

Series/type:	B9513
Ordering code:	B39202B9513L310

Date:	May 27, 2010
Version:	2.0

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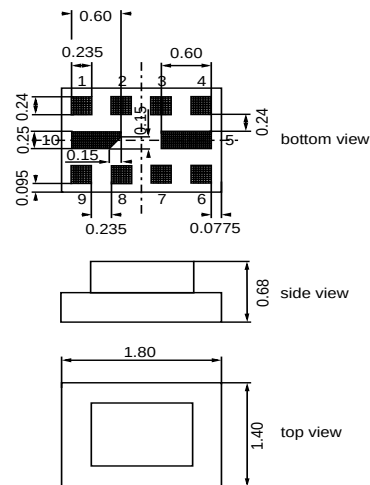
Data sheet

Application

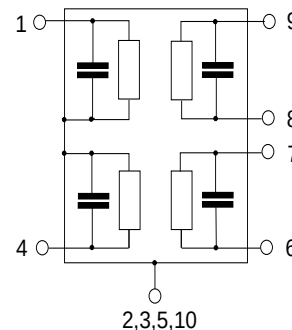
- Low-loss 2in1 RF filter for mobile telephone GSM1900 and GSM1800 systems, receive path (Rx)
- Usable passband:
Filter 1 (GSM1900): 60 MHz
Filter 2 (GSM1800): 75 MHz
- Unbalanced to balanced operation for both filters
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12


Features

- Package size 1.8 x 1.4 x 0.68 mm³
- Moisture Sensitive Level 3
- RoHS compatible
- Approx. weight 0.006g
- Package for Surface Mount Technology (SMT)
- Ni, gold-plated terminals
- **RoHS compatible**
- **Electrostatic Sensitive Device (ESD)**


Pin configuration

- 1 Input [Duplex]
- 8,9 Output balanced [Filter 1]
- 6,7 Output balanced [Filter 2]
- 2,3,4,5,10 Case-ground



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SAW Rx 2in1 input duplex filter
1960.0 / 1842.5 MHz
Data sheet

Characteristics of Filter 1 (GSM1900)

Temperature range for specification: $T = -30\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$
 Terminating source impedance: $Z_S = 50\text{ }\Omega \parallel 3.3\text{nH}$
 Terminating load impedance: $Z_L = 150\text{ }\Omega \parallel 18\text{nH (balanced)}$

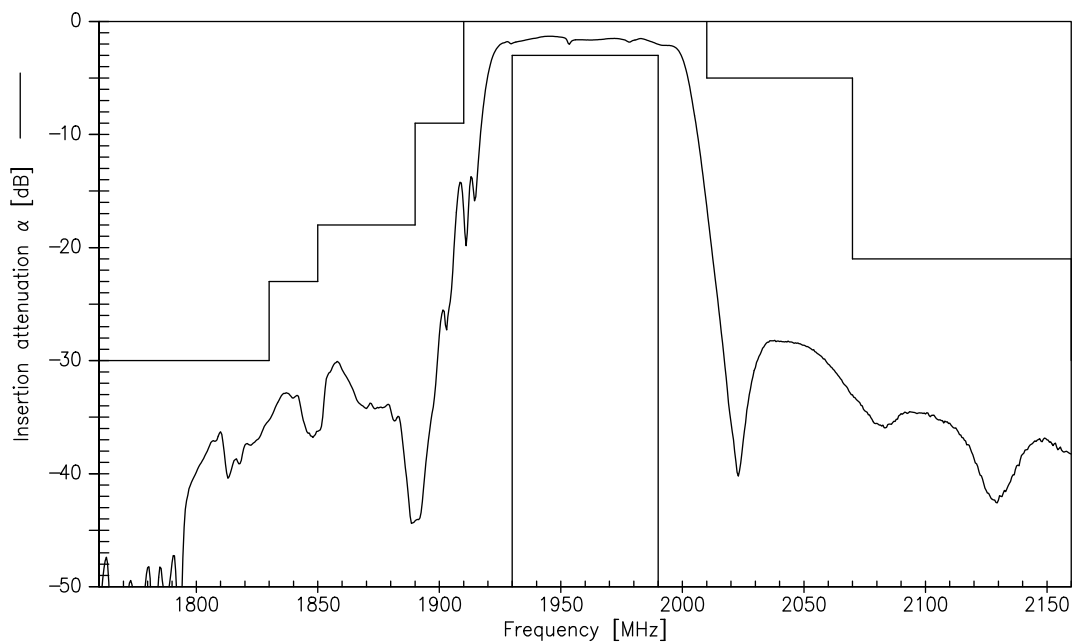
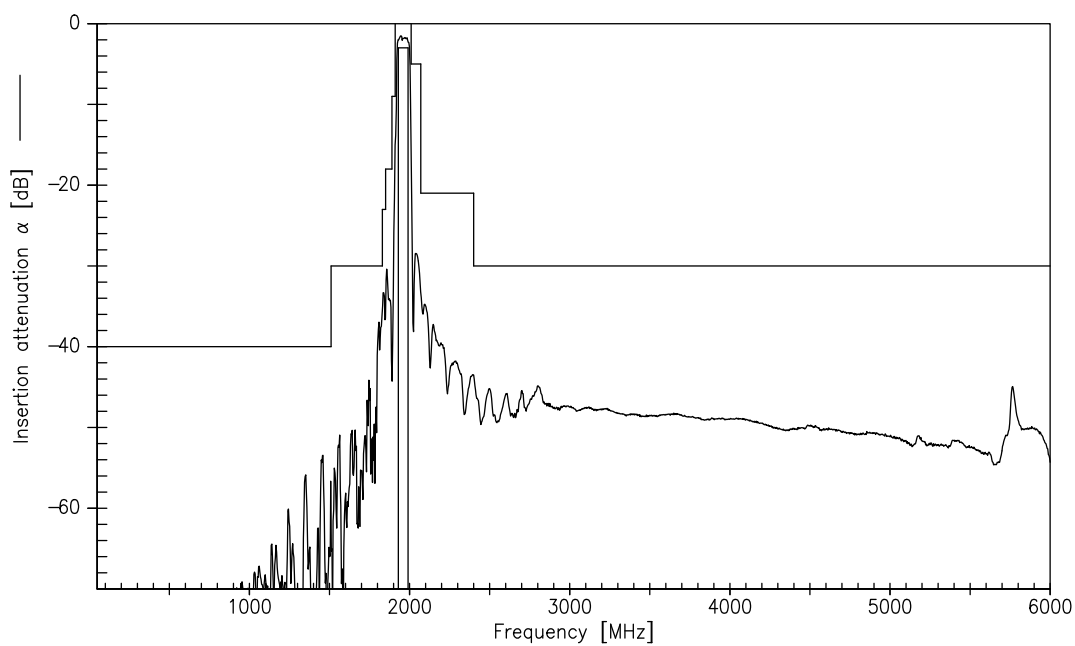
		min.	typ. @ 25 °C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	$\alpha_{\max}$	—	2.2	3.0	dB
1930.0 ... 1990.0 MHz					
Amplitude ripple (p-p)	$\Delta\alpha$	—	0.9	1.8	dB
1930.0 ... 1990.0 MHz					
Input VSWR		—	1.5	2.0	
1930.0 ... 1990.0 MHz					
Output VSWR		—	1.6	2.1	
1930.0 ... 1990.0 MHz					
CMRR ($S_{21}-S_{31} / S_{21}+S_{31}$)		22 ¹⁾	29	—	dB
1930.0 ... 1990.0 MHz					
Attenuation	α				
10.0 ... 1510.0 MHz		40	53	—	dB
1510.0 ... 1830.0 MHz		30	35	—	dB
1830.0 ... 1850.0 MHz		23	33	—	dB
1850.0 ... 1890.0 MHz		18	30	—	dB
1890.0 ... 1910.0 MHz		9	14	—	dB
2010.0 ... 2070.0 MHz		4	12	—	dB
2070.0 ... 2400.0 MHz		21	33	—	dB
2400.0 ... 6000.0 MHz		30	43	—	dB

¹⁾ A CMRR of 21.9dB corresponds to a phase balance of 7° together with an amplitude balance of 0.9dB

Maximum ratings of Filter 1

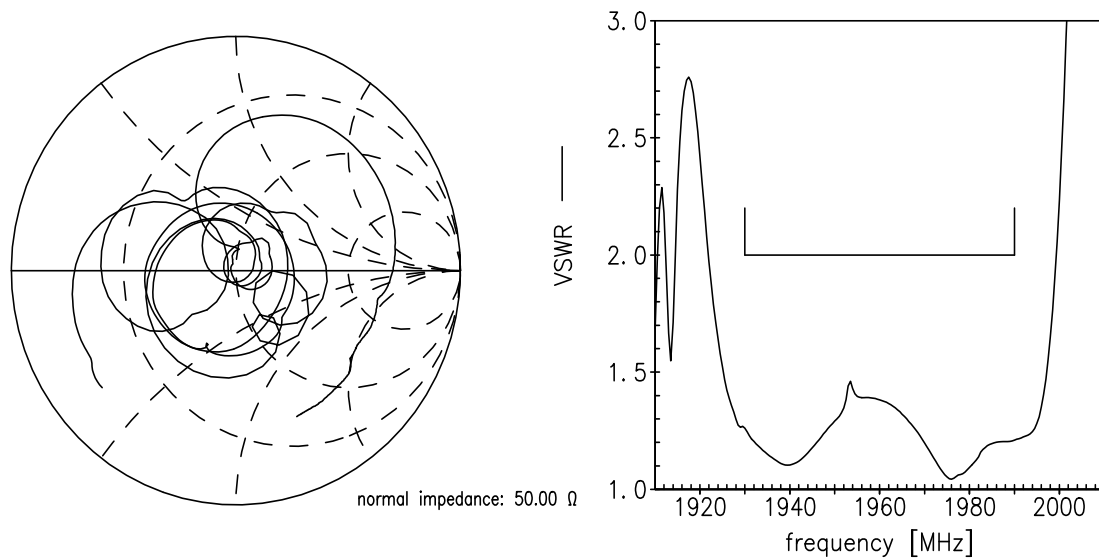
Operable temperature range	T	−40/+85	°C	
Storage temperature range	T _{stg}	−40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 1 pulse
Input Power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

¹⁾ acc. to JESD22-A115A (machine model), 1 negative & 1 positive pulse.

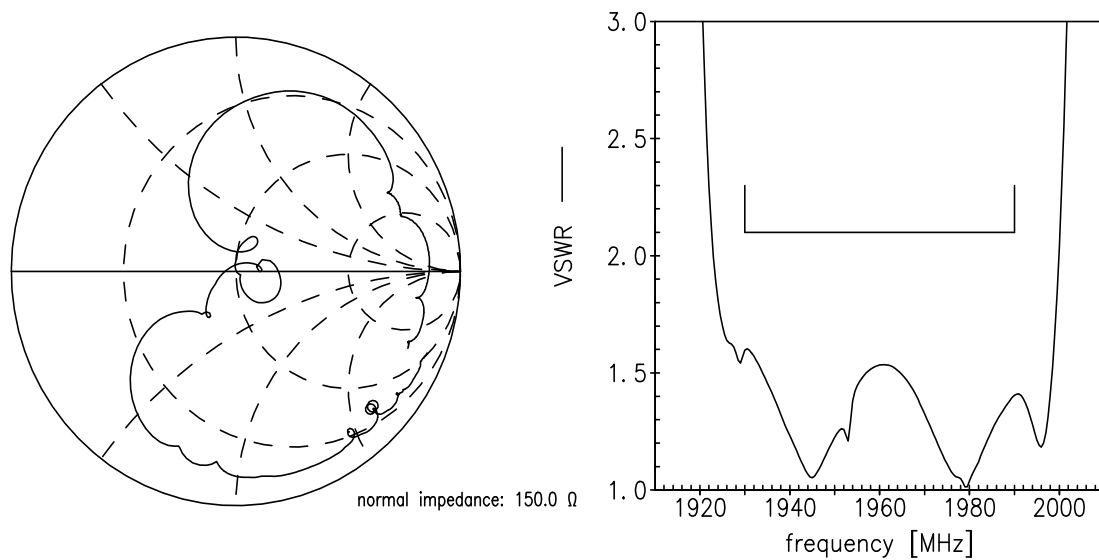
Transfer function Filter 1 (GSM1900)

Transfer function Filter 1 (GSM1900) - Wideband


Smith charts Filter 1 (GSM1900)

S_{11} function



S_{22} function



SAW Components
B9513
SAW Rx 2in1 input duplex filter
1960.0 / 1842.5 MHz
Data sheet

Characteristics of Filter 2 (GSM1800)

Temperature range for specification: $T = -30\text{ }^{\circ}\text{C to }+85\text{ }^{\circ}\text{C}$
 Terminating source impedance: $Z_S = 50\text{ }\Omega \parallel 3.3\text{nH}$
 Terminating load impedance: $Z_L = 150\text{ }\Omega \parallel 15\text{nH (balanced)}$

		min.	typ. @ 25 °C	max.	
Center frequency	f_c	—	1842.5	—	MHz
Maximum insertion attenuation 1805.0 ... 1880.0 MHz	$\alpha_{\max}$	—	2.2	2.8	dB
Amplitude ripple (p-p) 1805.0 ... 1880.0 MHz	$\Delta\alpha$	—	1.0	1.8	dB
Input VSWR 1805.0 ... 1880.0 MHz		—	1.5	2.0	
Output VSWR 1805.0 ... 1880.0 MHz		—	1.7	2.1	
CMRR ($ S_{21}-S_{31} / S_{21}+S_{31} $) 1805.0 ... 1880.0 MHz		20 ¹⁾	24	—	dB
Attenuation	α				
10.0 ... 940.0 MHz		45	62	—	dB
940.0 ... 1705.0 MHz		20	34	—	dB
1705.0 ... 1785.0 MHz		12	18	—	dB
1920.0 ... 1980.0 MHz		17	26	—	dB
1980.0 ... 2030.0 MHz		25	30	—	dB
2030.0 ... 2700.0 MHz		28	35	—	dB
2700.0 ... 6000.0 MHz		30	37	—	dB

¹⁾ A CMRR of 19.6dB corresponds to a phase balance of 10° together with an amplitude balance of 1.0dB

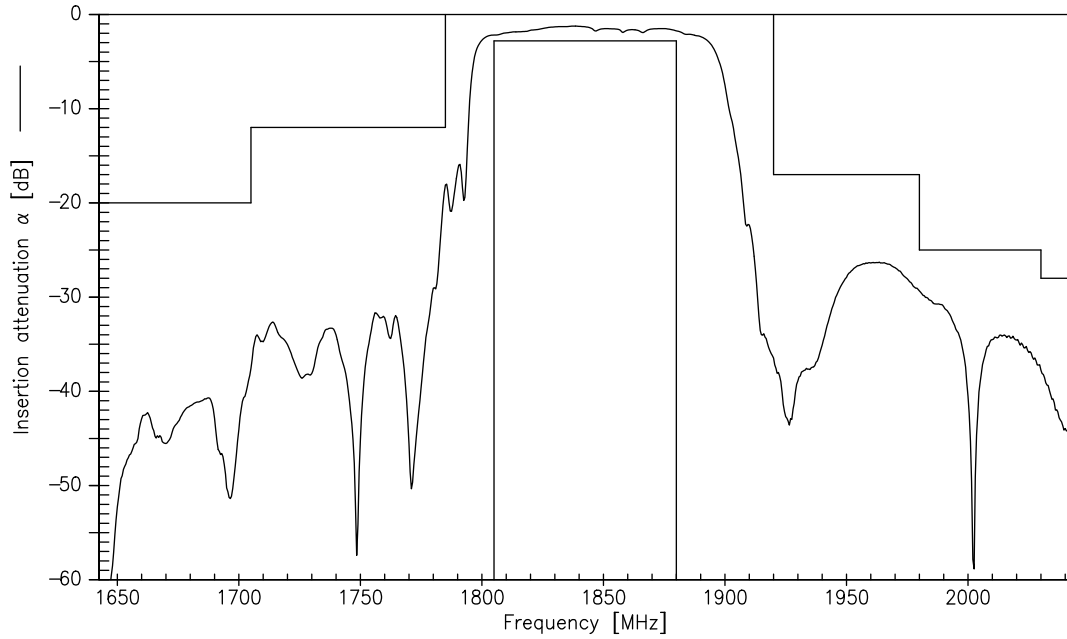
SAW Components	B9513
SAW Rx 2in1 input duplex filter	1960.0 / 1842.5 MHz
Data sheet	SMD

Maximum ratings of Filter 2

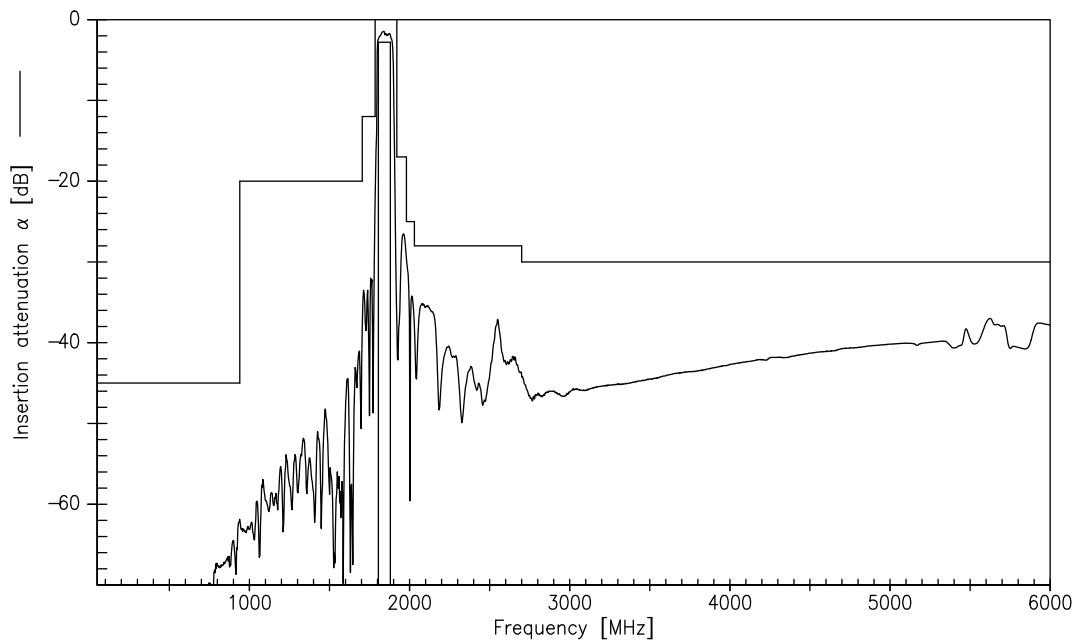
Operable temperature range	T	−40/+85	°C	
Storage temperature range	T _{stg}	−40/+85	°C	
DC voltage	V _{DC}	5	V	
ESD voltage	V _{ESD}	50 ¹⁾	V	machine model, 1 pulse
Input Power at				
GSM 850, GSM 900	P _{IN}	15	dBm	effective power in the on-state, duty cycle 4:8
GSM 1800, GSM 1900	P _{IN}	15	dBm	
Tx bands				

¹⁾ acc. to JEESD22-A115A (machine model), 1 negative & 1 positive pulse.

Transfer function Filter 2 (GSM1800)

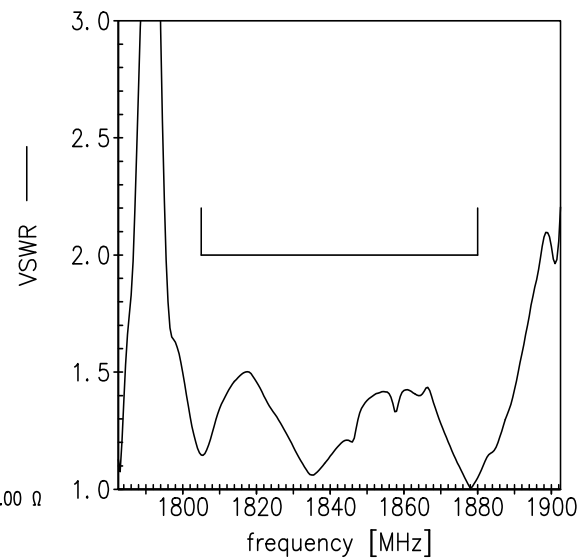
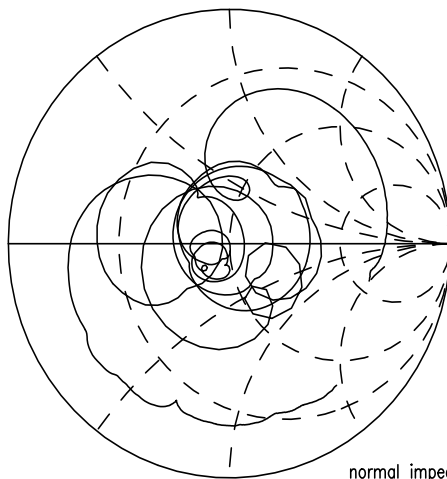


Transfer function Filter 2 (GSM1800) - Wideband

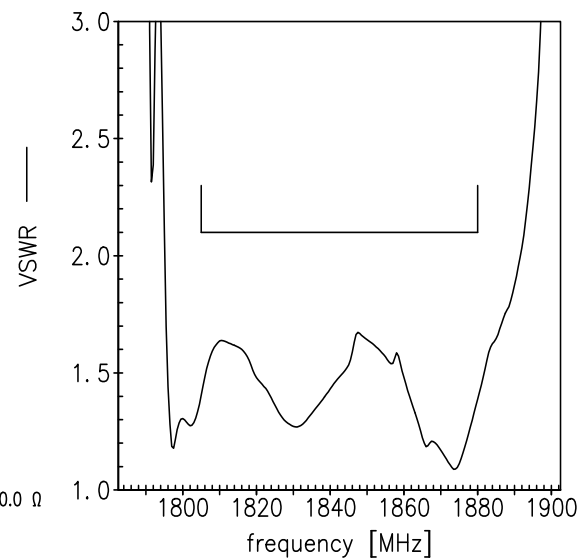
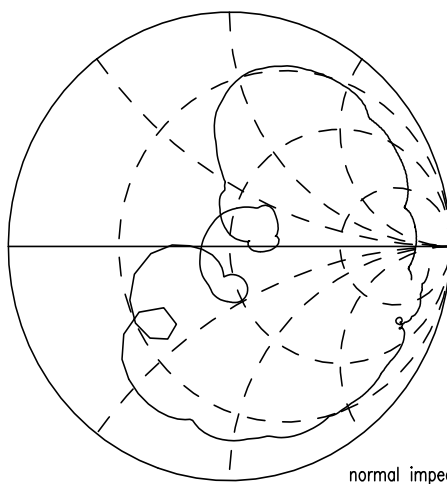


Smith charts Filter 2 (GSM1800)

S₁₁ function



S₂₂ function



SAW Components	B9513
SAW Rx 2in1 input duplex filter	1960.0 / 1842.5 MHz

Data sheet



References

Type	B9513
Ordering code	B39202B9513L310
Marking and package	C61157-A7-A153
Packaging	F61074-V8226-Z000
Date codes	L_1126
S-parameters	B9513_LB_NB.s3p B9513_LB_WB.s3p B9513_UB_NB.s3p B9513_UB_WB.s3p See file header for port/pin assignment table.
Soldering profile	S_6001
RoHS compatible	defined as compatible with the following documents: "DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. 2005/618/EC from April 18th, 2005, amending Directive 2002/95/EC of the European Parliament and of the Council for the purposes of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment."
Moldability	Before using in overmolding environment, please contact your EPCOS sales office.

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Surface Acoustic Wave Components Division

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