SAW Components

SAW Rx 2in1 filter

GSM 1900 / GSM 1800

Series/type:	**B9502**
Ordering code:	**B39202B9502L310**
Date:	January 04, 2010
Version:	2.2

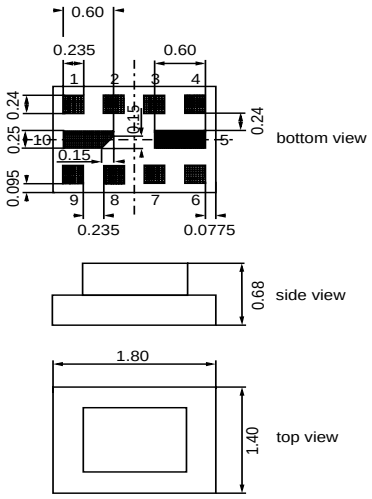
EPCOS AG is a TDK Group Company.

Application

- Low-loss 2in1 RF filter for mobile telephone GSM 1900 and GSM 1800 systems, receive path (Rx)
- Usable passband:
  Filter 1 (GSM 1900): 60 MHz
  Filter 2 (GSM 1800): 75 MHz
- Unbalanced to balanced operation for all filters
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Low amplitude ripple
- Suitable for GPRS class 1 to 12

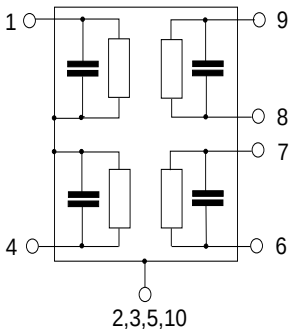
Features

- Package size 1.8 x1.4 x 0.68 mm^3
- Package code QCS10U
- RoHS compatible
- Approx. weight 0.006g
- Package for **S**urface **M**ount **T**echnology (**SMT**)
- Ni, gold-plated terminals
- **E**lectrostatic **S**ensitive **D**evice (**ESD**)



Pin configuration

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



Characteristics of Filter 1 (GSM 1900)

Temperature range for specification: T = -20 to +75 ˚C
Terminating source impedance: Z_S = 50 Ω (unbalanced)
Terminating load impedance: Z_L = 150 Ω (balanced) || 13nH

		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1960.0	—	MHz
Maximum insertion attenuation	α_{max}				
1930.0 ... 1990.0 MHz		—	1.3[1)]	2.3[2)]	dB CTQ
Amplitude ripple (p-p)	$\Delta\alpha$				
1930.0 ... 1990.0 MHz		—	0.4	1.4[3)]	dB
Input VSWR					
1930.0 ... 1990.0 MHz		—	1.7	2.1	
Output VSWR					
1930.0 ... 1990.0 MHz		—	1.7	2.1	
Output amplitude balance ($\|S_{31}/S_{21}\|$)					
1930.0 ... 1990.0 MHz		-1.3	-0.8/ 0.2	1.3	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21}))+180^\circ$					
1930.0 ... 1990.0 MHz		-10	-7 / 5	10	°
Attenuation	α				
10.0 ... 1510.0 MHz		40	44	—	dB
1510.0 ... 1830.0 MHz		30	34	—	dB
1830.0 ... 1890.0 MHz		20	25	—	dB
1890.0 ... 1910.0 MHz		12	16	—	dB
2010.0 ... 2070.0 MHz		12	17	—	dB
2070.0 ... 2400.0 MHz		19	23	—	dB
2400.0 ... 2500.0 MHz		35	40	—	dB
2500.0 ... 3860.0 MHz		28	33	—	dB
3860.0 ... 3980.0 MHz		36	43	—	dB
3980.0 ... 5790.0 MHz		30	39	—	dB
5790.0 ... 6000.0 MHz		32	40	—	dB

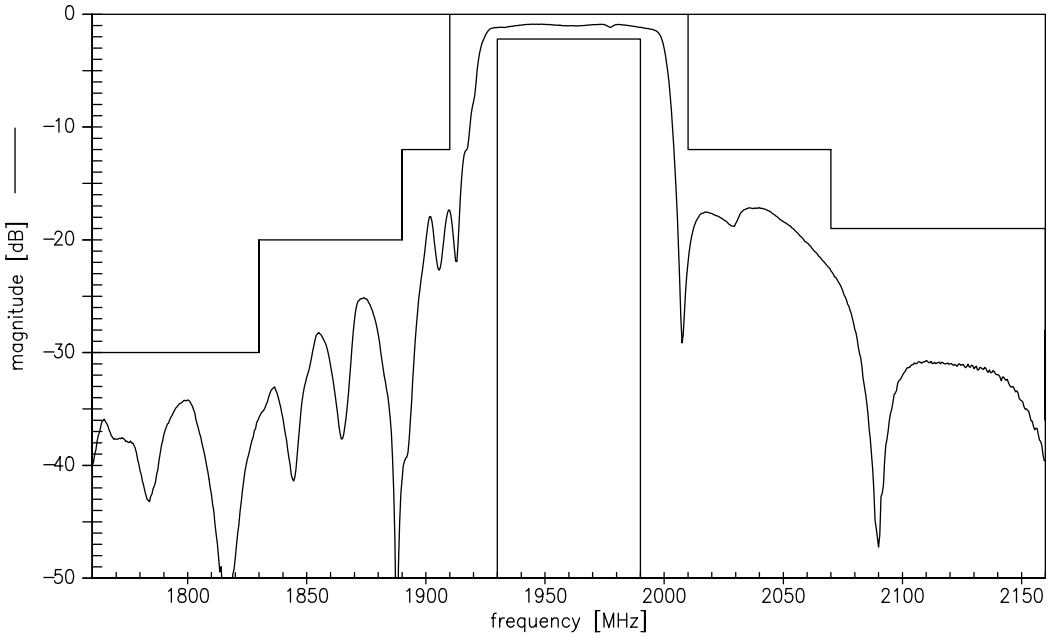
1) Typical value excluding PCB losses of 0.29 dB
2) 2.2 dB at 25 ˚ c
3) 1.3 dB at 25 ˚ c

Maximum ratings of filter 1

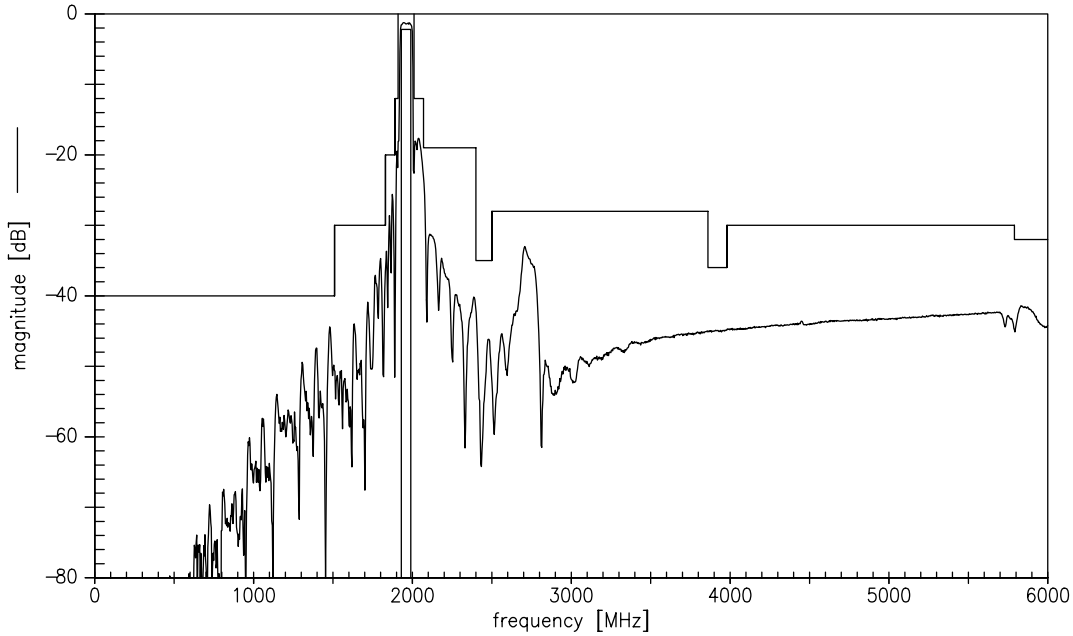
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Transfer function of filter 1

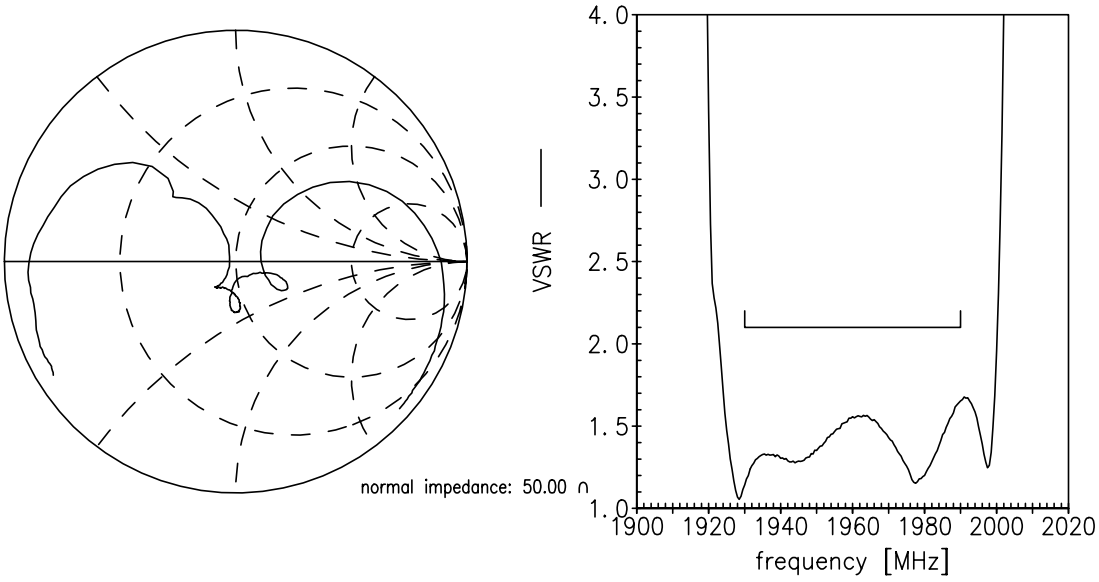


Transfer function of filter 1 - wideband

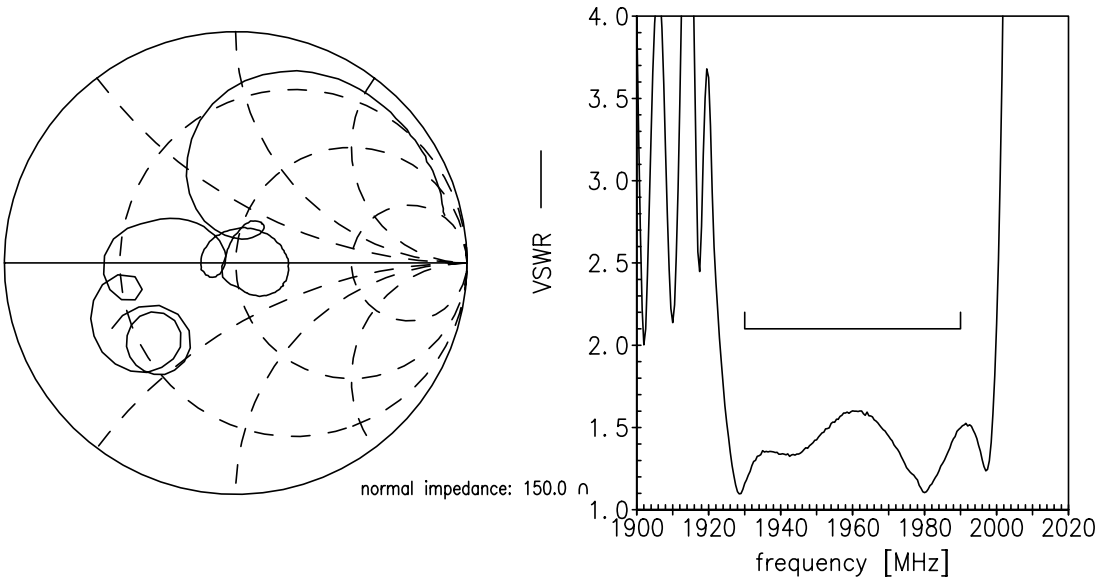


Smith charts filter 1

S_{11} function



S_{22} function



Characteristics of filter 2 (GSM 1800)

Temperature range for specification: T = -20 to +75 ˚C
Terminating source impedance: Z_S = 50 Ω (unbalanced)
Terminating load impedance: Z_L = 150 Ω (balanced) || 13nH

		min.	typ. @ 25 ˚C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{max}				
1805.0 ... 1880.0 MHz		—	1.4[1)]	2.2[2)]	dB CTQ
Amplitude ripple (p-p)	$\Delta\alpha$				
1805.0 ... 1880.0 MHz		—	0.5	1.4[3)]	dB
Input VSWR					
1805.0 ... 1880.0 MHz		—	1.7	2.1	
Output VSWR					
1805.0 ... 1880.0 MHz		—	1.7	2.1	
Output amplitude balance ($\|S_{31}/S_{21}\|$)					
1805.0 ... 1880.0 MHz		-1.0	-0.8/0.4	1.0	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21}))+180^\circ$					
1805.0 ... 1880.0 MHz		-10	-5.0/5.0	10	°
Attenuation	α				
10.0 ... 902.0 MHz		45	53	—	dB
902.0 ... 940.0 MHz		45	53	—	dB
940.0 ... 1705.0 MHz		28	40	—	dB
1705.0 ... 1785.0 MHz		12[4)]	16	—	dB
1920.0 ... 1980.0 MHz		17	22	—	dB
1980.0 ... 2030.0 MHz		25	30	—	dB
2030.0 ... 2400.0 MHz		28	34	—	dB
2400.0 ... 2500.0 MHz		32	39	—	dB
2500.0 ... 2775.0 MHz		28	33	—	dB
2775.0 ... 2880.0 MHz		38	46	—	dB
2880.0 ... 3610.0 MHz		28	46	—	dB
3610.0 ... 3760.0 MHz		38	46	—	dB
3760.0 ... 5415.0 MHz		28	39	—	dB
5415.0 ... 5640.0 MHz		32	38	—	dB
5640.0 ... 6000.0 MHz		28	38	—	dB

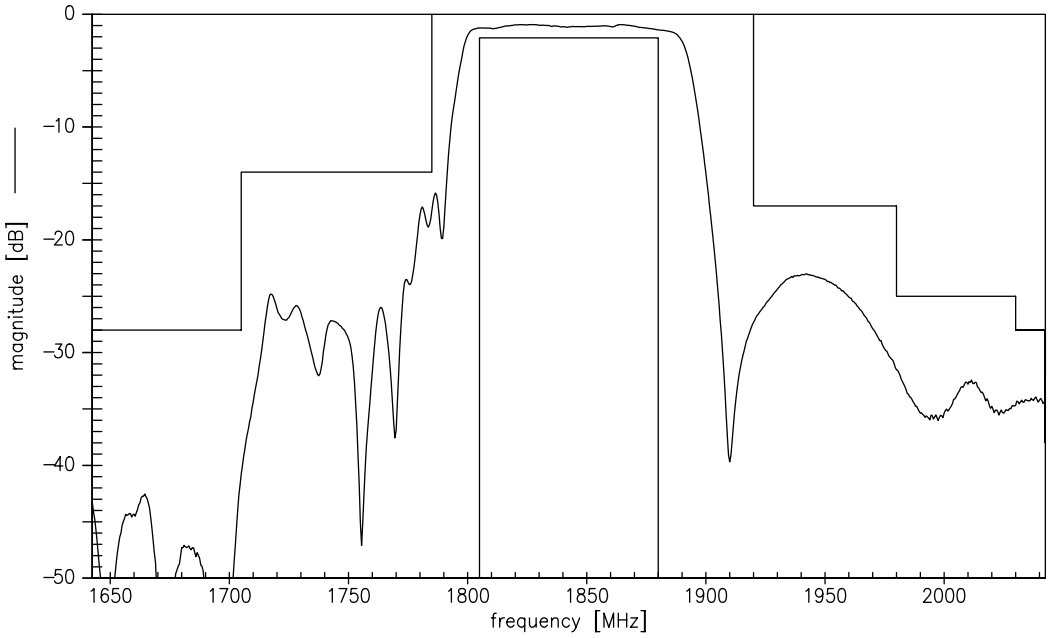
1) Typical Value excluding PCB losses of 0.27dB
2) 2.1 dB at 25 ˚ c
3) 1.3 dB at 25 ˚ c
4) 14 dB at 25 ˚ c

Maximum ratings of filter 2

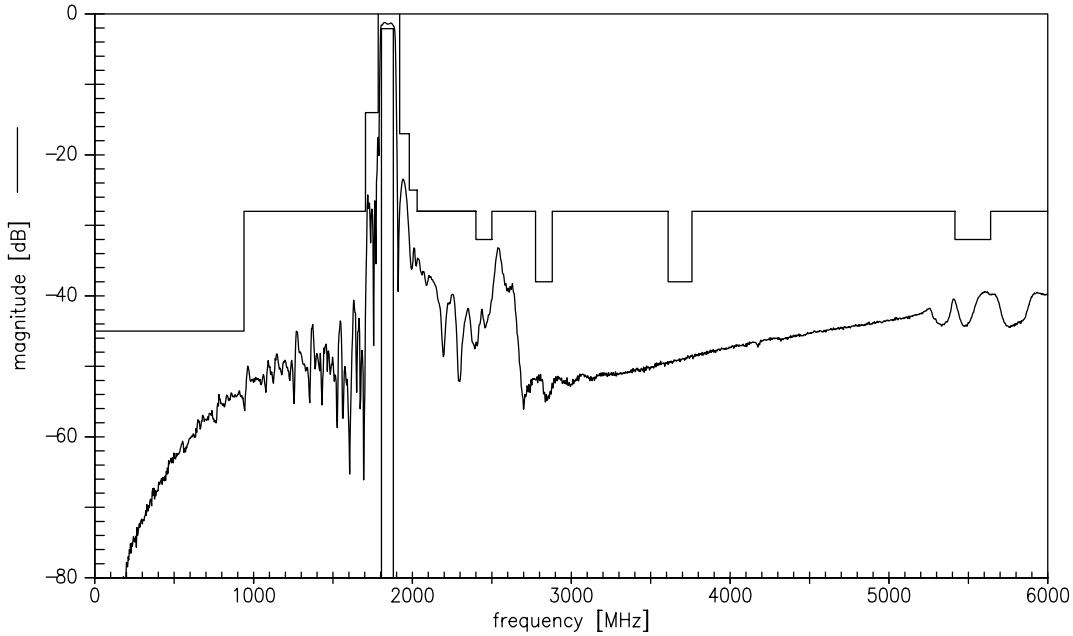
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Transfer function of filter 2

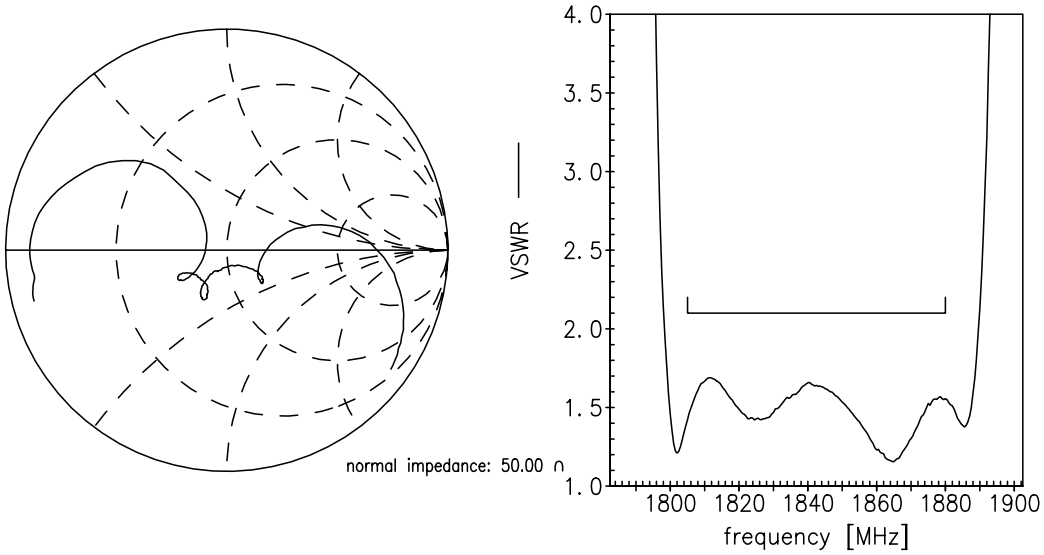


Transfer function of filter 2 - wideband

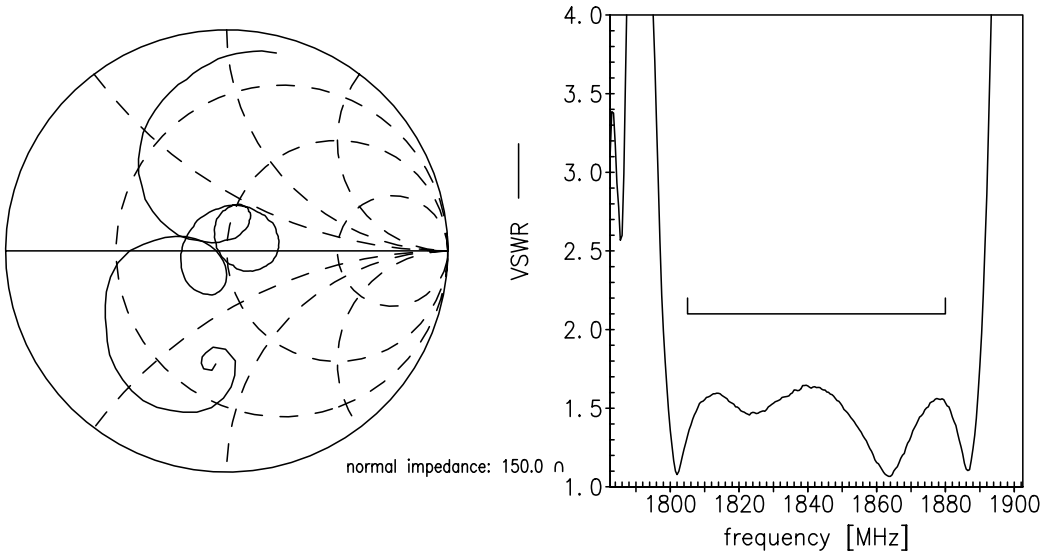


Smith charts filter 2

S_{11} function



S_{22} function



References

Type	B9502
Ordering code	B39202B9502L310
Marking and package	C61157-A7-A152
Packaging	F61074-V8226-Z000
Date codes	L_1126
S-parameters	B9502_UB_NB.s3p B9502_UB_WB.s3p B9502_LB_NB.s3p B9502_LB_WB.s3p
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."

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