SAW Components

SAW Rx 2in1 filter

GSM 900 / GSM 1800

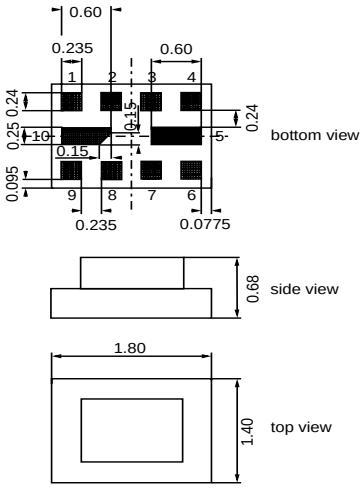
Series/type:	**B9501**
Ordering code:	**B39182B9501L310**
Date:	May 21, 2008
Version:	2.0

Application

- Low-loss 2in1 RF filter for mobile telephone GSM 900 and GSM 1800 systems, receive path (Rx)
- Usable passband:
  Filter 1 (GSM 900): 35 MHz
  Filter 2 (GSM 1800): 75 MHz
- Unbalanced to balanced operation for both filters
- Very low insertion attenuation
- Low amplitute ripple
- Impedance transformation from 50 Ω to 150 Ω for both filters
- Suitable for GPRS class 1 to 12

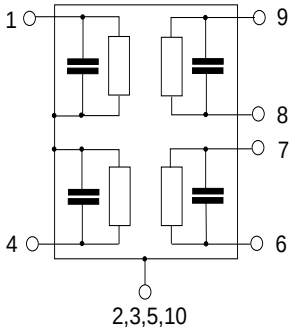
Features

- Package size 1.8 x 1.4 x 0.68 mm³
- Package code QCS10U
- RoHS compatible
- Approx. weight 0.006 g
- 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



Data sheet SMD

Characteristics of filter 1 (GSM 900)

Temperature range for specification: T = -20 ˚C to +75 ˚C
Terminating source impedance: Z_S = 50 Ω
Terminating load impedance: Z_L = 150 Ω || 56 nH (balanced)

		B9501			
		min.	typ. @25˚C	max.	
Center frequency	f_C	—	942.5	—	MHz
Maximum insertion attenuation	α_{max}				
925.0 ... 960.0 MHz		—	1.3[1)]	2.1[2)]	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
925.0 ... 960.0 MHz		—	0.5	1.3[3)]	dB
Input VSWR					
925.0 ... 960.0 MHz		—	1.7	2.0	
Output VSWR					
925.0 ... 960.0 MHz		—	1.7	2.0	
Output amplitude balance ($\|S_{31}/S_{21}\|$)					
925.0 ... 960.0 MHz		–1.0	-0.6/0.6	1.0	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)					
925.0 ... 960.0 MHz		–10	-3/+3	10	˚
Attenuation	α				
10.0 ... 480.0 MHz		45	55	—	dB
480.0 ... 900.0 MHz		30	34	—	dB
900.0 ... 905.0 MHz		26	30	—	dB
905.0 ... 915.0 MHz		20	30	—	dB
980.0 ... 1000.0 MHz		25	29	—	dB
1000.0 ... 1850.0 MHz		28	36	—	dB
1850.0 ... 1920.0 MHz		40	49	—	dB
1920.0 ... 3700.0 MHz		35	43	—	dB
3700.0 ... 6000.0 MHz		32	37	—	dB

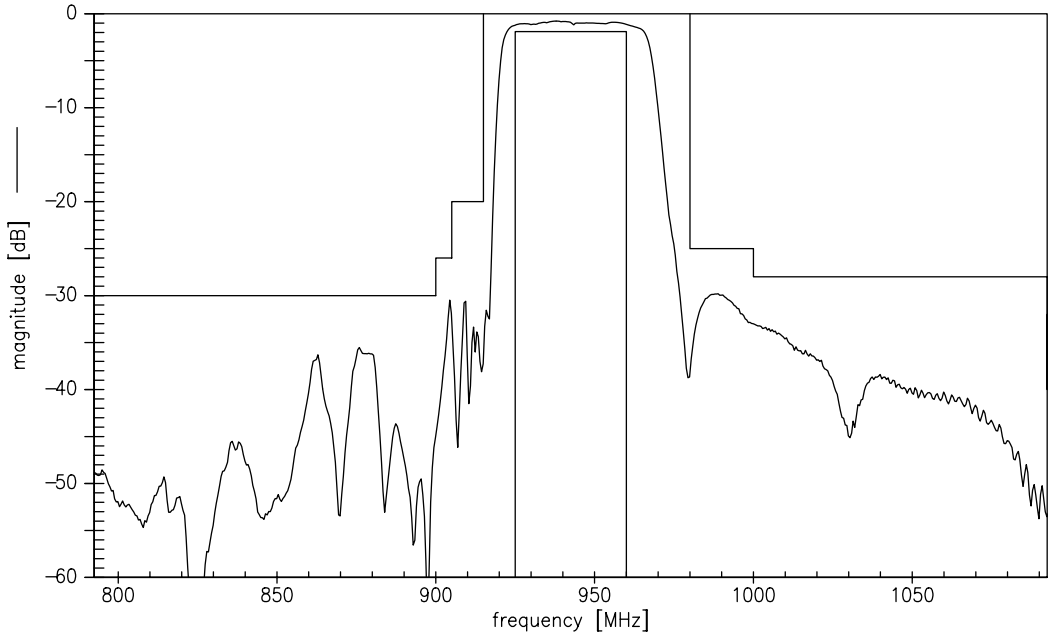
1) Typical value excluding PCB losses of 0.16 dB.
2) 1.9 dB at 25 ˚c
3) 1.2 dB at 25 ˚c

Maximum ratings of filter 1

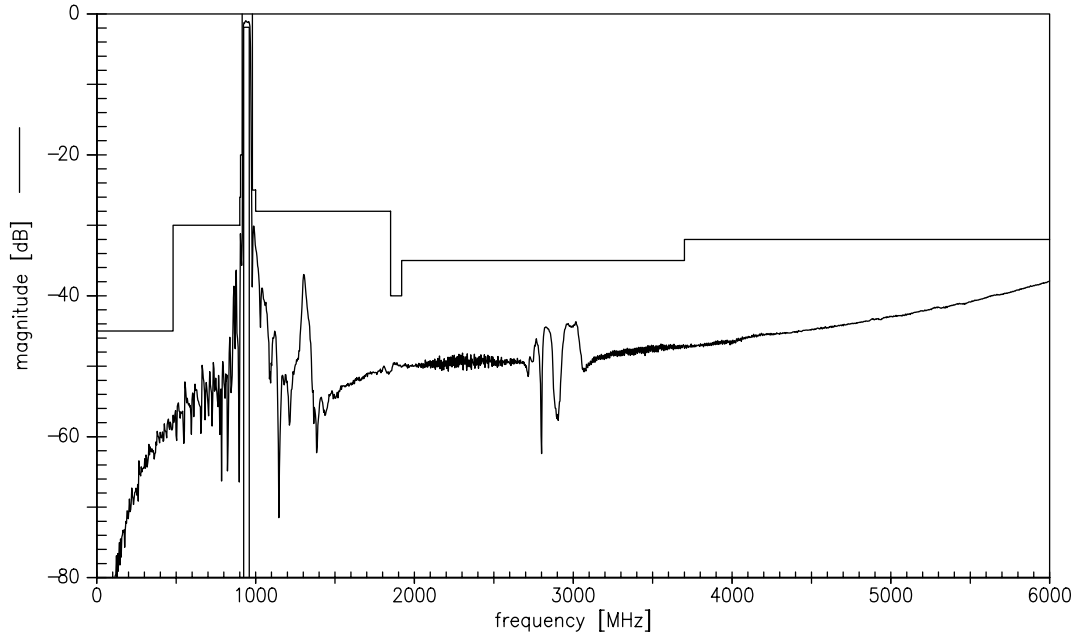
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	100[1)]	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Transfer function of filter 1

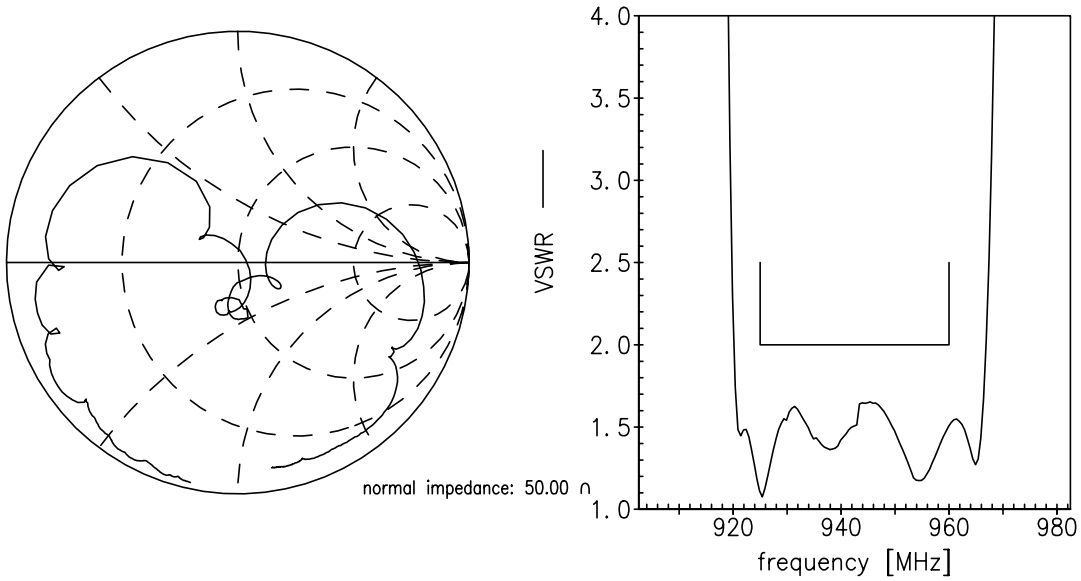


Transfer function of filter 1 - wideband

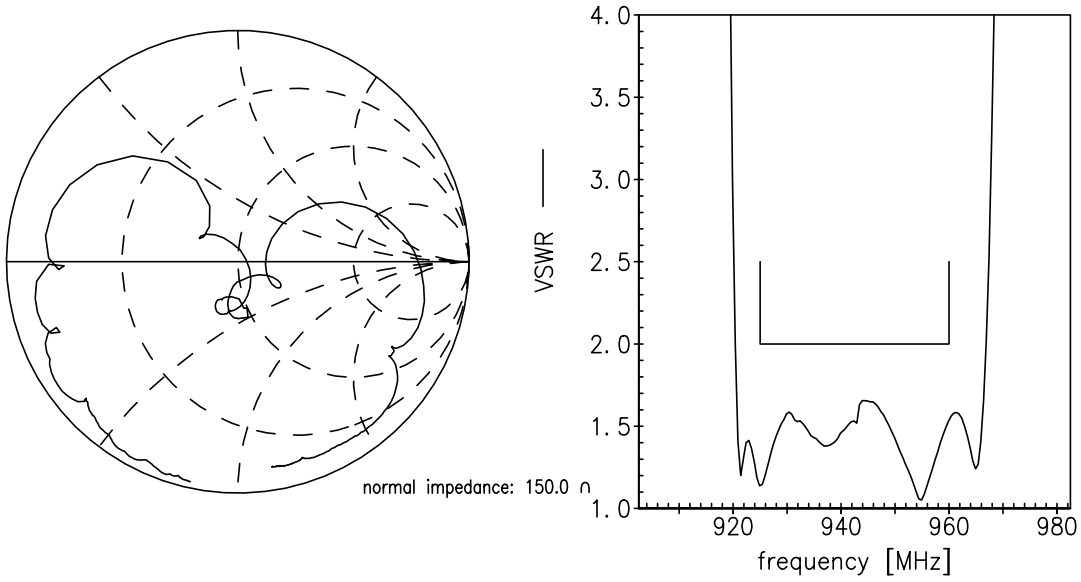


Smith charts filter 1

S_{11} function



S_{22} function



Data sheet SMD

Characteristics of filter 2 (GSM 1800)

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

		B9501			
		min.	typ. @25˚C	max.	
Center frequency	f_C	—	1842.5	—	MHz
Maximum insertion attenuation	α_{max}				
1805.0 ... 1880.0 MHz		—	1.3 [1]	2.2 [2]	dB
Amplitude ripple (p-p)	$\Delta\alpha$				
1805.0 ... 1880.0 MHz		—	0.5	1.4 [3]	dB
Input VSWR					
1805.0 ... 1880.0 MHz		—	1.8	2.1	
Output VSWR					
1805.0 ... 1880.0 MHz		—	1.8	2.1	
Output amplitude balance ($\|S_{31}/S_{21}\|$)					
1805.0 ... 1880.0 MHz		–1.0	-0.7/0.7	1.0	dB
Output phase balance ($\phi(S_{31})-\phi(S_{21})+180^\circ$)					
1805.0 ... 1880.0 MHz		–10	-7/+7	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	39	—	dB
1705.0 ... 1785.0 MHz		12 [4]	16	—	dB
1920.0 ... 1980.0 MHz		17	22	—	dB
1980.0 ... 2030.0 MHz		25	32	—	dB
2030.0 ... 2400.0 MHz		28	34	—	dB
2400.0 ... 2500.0 MHz		32	40	—	dB
2500.0 ... 2775.0 MHz		28	33	—	dB
2775.0 ... 2880.0 MHz		38	50	—	dB
2880.0 ... 3610.0 MHz		28	47	—	dB
3610.0 ... 3760.0 MHz		38	46	—	dB
3760.0 ... 5415.0 MHz		28	37	—	dB
5415.0 ... 5640.0 MHz		32	37	—	dB
5640.0 ... 6000.0 MHz		28	37	—	dB

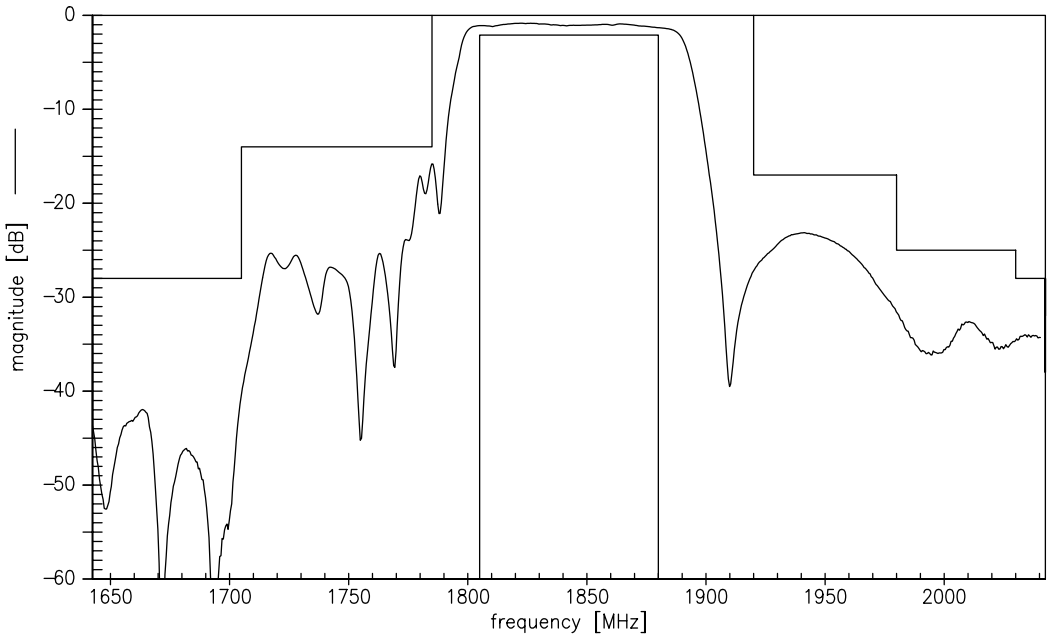
[1] Typical value excluding PCB losses of 0.27 dB.
[2] 2.1 dB at 25 ˚ c
[3] 1.3 dB at 25 ˚ c
[4] 14 dB at 25 ˚ c

Maximum ratings of filter 2

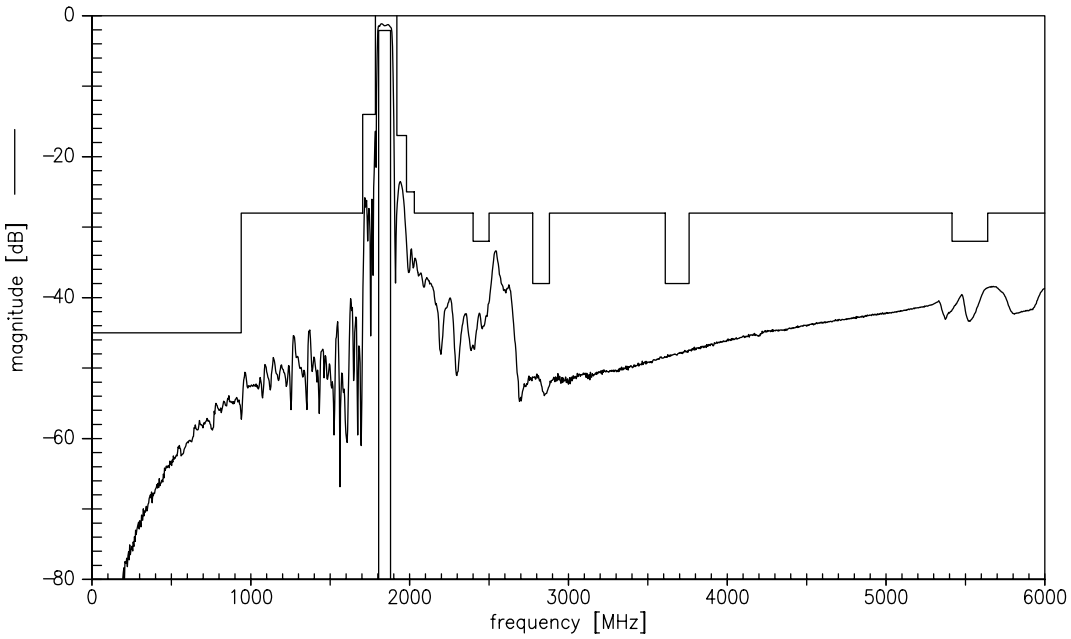
Operable temperature range	T	–40/+85	˚C	
Storage temperature range	T_{stg}	–40/+85	˚C	
DC voltage	V_{DC}	5	V	
ESD voltage	V_{ESD}	50[1)]	V	machine model, 1 pulse
Input power at				
GSM 850, GSM 900	P_{IN}	15	dBm	effective power in the on-state,
GSM 1800, GSM 1900	P_{IN}	15	dBm	duty cycle 4:8
Tx bands				

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

Transfer function of filter 2

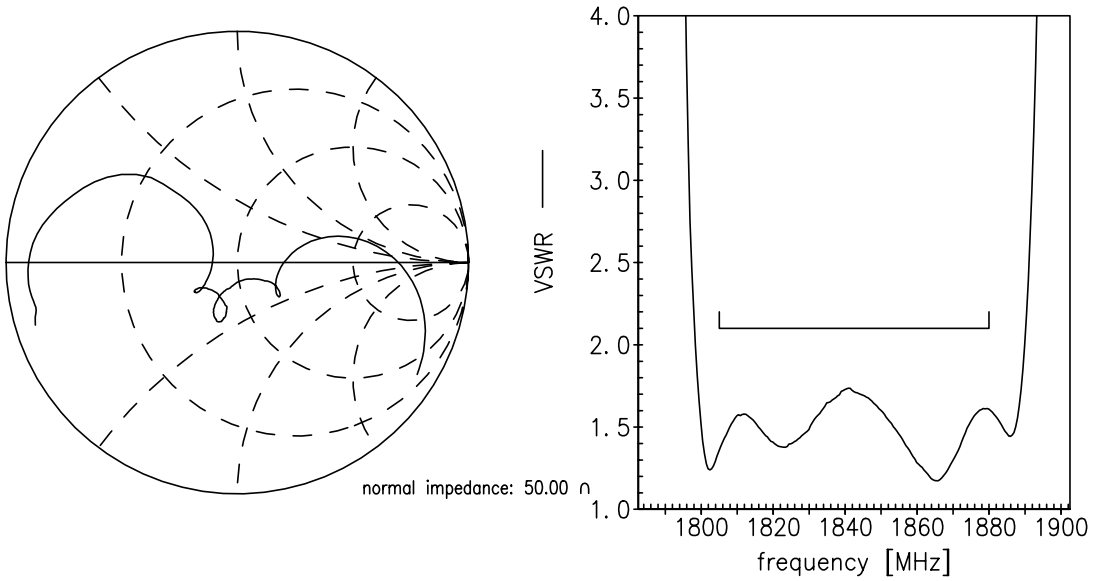


Transfer function of filter 2 - wideband

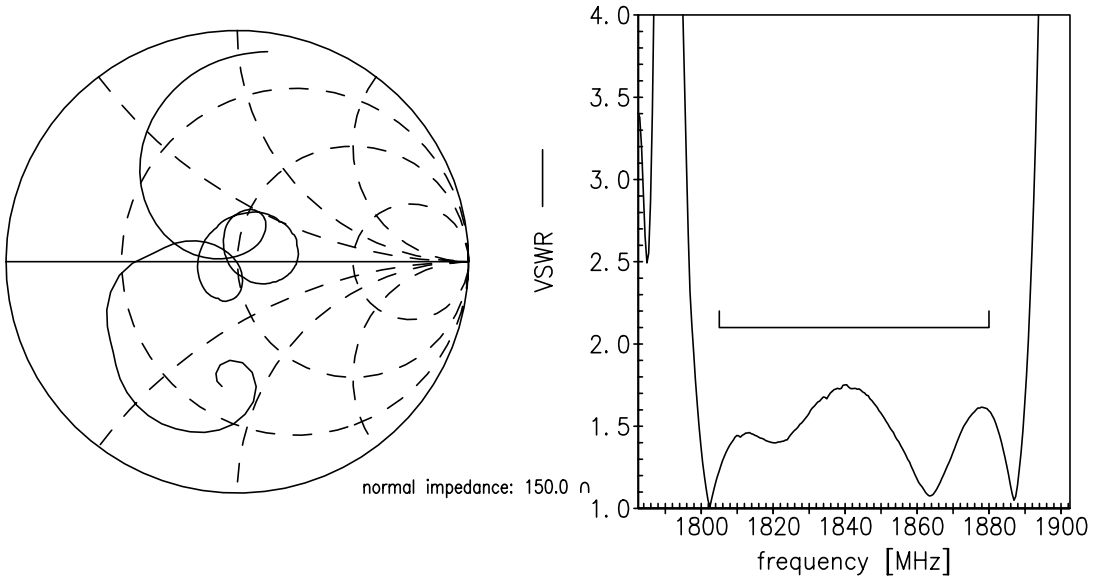


Smith charts filter 2

S_{11} function



S_{22} function



References

Type	B9501
Ordering code	B39182B9501L310
Marking and package	C61157-A6-A152
Packaging	F61074-V8226-Z000
Date code	L_1126
S-parameters	B9501_LB_NB.s3p B9501_LB_WB.s3p B9501_UB_NB.s3p B9501_UB_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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