

PHILIPS

Data handbook



Electronic
components
and materials

Semiconductors

Book S12

1984

Surface acoustic wave devices

Elcoma – Philips Electronic Components and Materials Division – embraces a world-wide group of companies operating under the following names:

IBRAPE

PHILIPS

MBLE



Miniwatt

signetics

Mullard

VALVO

Elcoma offers you a technological partnership in developing your systems to the full. A partnership to which we can bring

- world-wide production and marketing
- know-how
- systems approach
- continuity
- broad product line
- fundamental research
- leading technologies
- applications support
- quality

SURFACE ACOUSTIC WAVE FILTERS

Contents

	<i>page</i>
1. I.F. filters for television	1
Combined sound and vision filters	3
Split sound and vision filters	39
Satellite filters	47
2. Special purpose filters	51
Transmitter and transposer filters for television.	53
Telephony filters.	93
Index	97

DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of four series of handbooks:

ELECTRON TUBES	BLUE
SEMICONDUCTORS	RED
INTEGRATED CIRCUITS	PURPLE
COMPONENTS AND MATERIALS	GREEN

The contents of each series are listed on pages iv to viii.

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application information is given it is advisory and does not form part of the product specification.

Condensed data on the preferred products of Philips Electronic Components and Materials Division is given in our Preferred Type Range catalogue (issued annually).

Information on current Data Handbooks and on how to obtain a subscription for future issues is available from any of the Organizations listed on the back cover.

Product specialists are at your service and enquiries will be answered promptly.

ELECTRON TUBES (BLUE SERIES)

The blue series of data handbooks comprises:

- T1 Tubes for r.f. heating**
- T2a Transmitting tubes for communications, glass types**
- T2b Transmitting tubes for communications, ceramic types**
- T3 Klystrons, travelling-wave tubes, microwave diodes**
- ET3 Special Quality tubes, miscellaneous devices (will not be reprinted)**
- T4 Magnetrons for microwave heating**
- T5 Cathode-ray tubes**
Instrument tubes, monitor and display tubes, C.R. tubes for special applications
- T6 Geiger-Müller tubes**
- T7 Gas-filled tubes**
Segment indicator tubes, indicator tubes, dry reed contact units, thyratrons, industrial rectifying tubes, ignitrons, high-voltage rectifying tubes, associated accessories
- T8 Picture tubes and components**
Colour TV picture tubes, black and white TV picture tubes, colour monitor tubes for data graphic display, monochrome monitor tubes for data graphic display, components for colour television, components for black and white television and monochrome data graphic display
- T9 Photo and electron multipliers**
Photomultiplier tubes, phototubes, single channel electron multipliers, channel electron multiplier plates
- T10 Camera tubes and accessories**
- T11 Microwave semiconductors and components**
- T12 Vidicons and Newvicons**
- T13 Image intensifiers**
- T14 Infrared detectors**
- T15 Dry reed switches**
- T16 Monochrome tubes and deflection units**
Black and white TV picture tubes, monochrome data graphic display tubes, deflection units

} Data collations on these subjects are available now.
Data Handbooks will be published in 1985.

SEMICONDUCTORS (RED SERIES)

The red series of data handbooks comprises:

- S1 Diodes**
Small-signal germanium diodes, small-signal silicon diodes, voltage regulator diodes (< 1,5 W), voltage reference diodes, tuner diodes, rectifier diodes
- S2a Power diodes**
- S2b Thyristors and triacs**
- S3 Small-signal transistors**
- S4a Low-frequency power transistors and hybrid modules**
- S4b High-voltage and switching power transistors**
- S5 Field-effect transistors**
- S6 R.F. power transistors and modules**
- S7 Surface mounted semiconductors**
- S8 Devices for optoelectronics**
Photosensitive diodes and transistors, light-emitting diodes, displays, photocouplers, infrared sensitive devices, photoconductive devices.
- S9 Power MOS transistors**
- S10 Wideband transistors and wideband hybrid IC modules**
- S11 Microwave semiconductors** (to be published in 1985)
- S12 Surface acoustic wave devices**

INTEGRATED CIRCUITS (PURPLE SERIES)

The purple series of data handbooks comprises:

EXISTING SERIES

- IC1** Bipolar ICs for radio and audio equipment
- IC2** Bipolar ICs for video equipment
- IC3** ICs for digital systems in radio, audio and video equipment
- IC4** Digital integrated circuits
CMOS HE4000B family
- IC5** Digital integrated circuits – ECL
ECL10 000 (GX family), ECL100 000 (HX family), dedicated designs
- IC6** Professional analogue integrated circuits
- IC7** Signetics bipolar memories
- IC8** Signetics analogue circuits
- IC9** Signetics TTL logic
- IC10** Signetics Integrated Fuse Logic (IFL)
- IC11** Microprocessors, microcomputers and peripheral circuitry

NEW SERIES

IC01N	Radio, audio and associated systems Bipolar, MOS	
IC02N	Video and associated systems Bipolar, MOS	
IC03N	Telephony equipment Bipolar, MOS	
IC04N	HE4000B logic family CMOS	
IC05N	HE4000B logic family uncased integrated circuits CMOS	(published 1984)
IC06N	PC54/74HC/HCU/HCT logic families HCMOS	
IC07N	PC54/74HC/HCU/HCT uncased integrated circuits HCMOS	
IC08N	10K and 100K logic family ECL	(published 1984)
IC09N	Logic series TTL	(published 1984)
IC10N	Memories MOS, TTL, ECL	
IC11N	Analogue - industrial	
IC12N	Semi-custom gate arrays & cell libraries ISL, ECL, CMOS	
IC13N	Semi-custom integrated fuse logic IFL series 20/24/28	
IC14N	Microprocessors, microcontrollers & peripherals Bipolar, MOS	
IC15N	Logic series FAST TTL	(published 1984)

Note

Books available in the new series are shown with their date of publication.

COMPONENTS AND MATERIALS (GREEN SERIES)

The green series of data handbooks comprises:

- C1 Programmable controller modules**
PLC modules, PC20 modules
- C2 Television tuners, video modulators, surface acoustic wave filters**
- C3 Loudspeakers**
- C4 Ferroxcube potcores, square cores and cross cores**
- C5 Ferroxcube for power, audio/video and accelerators**
- C6 Synchronous motors and gearboxes**
- C7 Variable capacitors**
- C8 Variable mains transformers**
- C9 Piezoelectric quartz devices**
Quartz crystal units, temperature compensated crystal oscillators, compact integrated oscillators, quartz crystal cuts for temperature measurements
- C10 Connectors**
- C11 Non-linear resistors**
Voltage dependent resistors (VDR), light dependent resistors (LDR), negative temperature coefficient thermistors (NTC), positive temperature coefficient thermistors (PTC)
- C12 Variable resistors and test switches**
- C13 Fixed resistors**
- C14 Electrolytic and solid capacitors**
- C15 Ceramic capacitors***
- C16 Permanent magnet materials**
- C17 Stepping motors and associated electronics**
- C18 D.C. motors**
- C19 Piezoelectric ceramics**
- C20 Wire-wound components for TVs and monitors**
- C21 Assemblies for industrial use**
HNIL FZ/30 series, NORbits 60-, 61-, 90-series, input devices

* Film capacitors are included in Data Handbook C22 which will be published in 1985. The September 1982 edition of C15 should be retained until C22 is issued.

1. I.F. FILTERS FOR TELEVISION

Combined sound and vision filters

COMBINED SOUND

CCIR system		I				B & G			
type No.		RW153A		RW154		RW173		RW173A	
insertion loss	typ.	15	@ 37 MHz	20	@ 37 MHz	21	@ 37 MHz	15	@ 37 MHz
vision carrier	min. typ. max.	5 6 7	@ 39.5 MHz	5 6 7	@ 39.5 MHz	5 6 7	@ 38.9 MHz	5 6 7	@ 38.9 MHz
chroma carrier	min. typ. max.	1 3 4	@ 35.07 MHz	0 2 3	@ 35.07 MHz	1 2 4	@ 34.47 MHz	0 2 3	@ 34.47 MHz
sound carrier	min. typ. max.	18 20 22	@ 33.5 MHz	18 20 22	@ 33.5 MHz	17 19 21	@ 33.4 MHz	17 19 21	@ 33.4 MHz
adjacent vision trap	min. typ.	40 46	@ 31.5 MHz	40 46	@ 31.5 MHz	44 52	@ 31.9 MHz	40 50	@ 31.9 MHz
adjacent sound trap	min. typ.	46 50	@ 41.5 MHz	46 50	@ 41.5 MHz	48 58	@ 40.4 MHz	46 49	@ 40.4 MHz
adjacent sound trap (G)	min. typ.	—	—	—	—	40 45	@ 41.4 MHz	35 44	@ 41.4 MHz
u.h.f sound trap (L)	min. typ.	—	—	—	—	—	—	—	—
out of band	10 to 60 MHz	min.	38	38	38	35			
	60 to 100 MHz	min.	15	20	20	15			
pass band ripple (p-p)	typ.	0.5	0.5	0.5	0.5				
	max.	1.0	1.0	1.0	1.0				
group delay ripple	max.	± 40	± 40	shaped	shaped				
reflections and breakthrough	max.	40	40	40	40				
2Tsin ² pulse and bar k	max.	3	3	3	3				
impedance	input	typ.	1.4//8.5	2.3//5.5	2.0//5.5	1.3//17			
	output	typ.	1.5//14	2.2//11	1.1//15	1.1//8.5			

AND VISION TYPES

M		L		D		units*		
RW200		RW300		RW400				
15	@ 43.5 MHz	21	@ 37 MHz	14	@ 37 MHz	19	@ 34 MHz	dB
4 } 5 } 6 }	@ 45.75 MHz	5 } 6 } 7 }	@ 32.7 MHz	5 } 6 } 7 }	@ 32.7 MHz	5 } 6 } 7 }	@ 37 MHz	dB
2 } 3 } 4 }	@ 42.17 MHz	0	@ 36.95 MHz	0	@ 36.95 MHz	0 } 0.5 } 2 }	@ 32.5 MHz	dB
14 } 16 } 18 }	@ 41.25 MHz	—		—		18 } 21 } 24 }	@ 30.5 MHz	dB
50 } 52 }	@ 39.75 MHz	35 } 40 }	@ 40.7 MHz	35 } 40 }	@ 40.7 MHz	38 } 44 }	@ 29 MHz	dB
45 } 47 }	@ 47.25 MHz	40 } 44 }	@ 31.2 MHz	40 } 44 }	@ 31.2 MHz	37 } 40 }	@ 38.5 MHz	dB
—		—		—		—		dB
—		40 } 42 }	@ 39.2 MHz	40 } 42 }	@ 39.2 MHz	—		dB
40 (to 55 MHz)		35 (to 50 MHz)		35 (to 50 MHz)		34 (25 to 43 MHz)		dB
—		—		—		—		
0.5		0.5		0.5		0.5		dB
1.0		1.0		1.0		1.0		dB
shaped		± 40		± 40		± 50		ns
40		40		40		40		dB
3		3		3		3		%
1.0 // 16 } 1.0 // 9 }	@ 43.5 MHz	3.5 // 6.0 } 1.5 // 12 }	@ 37 MHz	2.0 // 7 } 1.0 // 16 }	@ 37 MHz	2.5 // 14 } 1.5 // 7.5 }	@ 34 MHz	kΩ // pF

*all dB values are expressed as attenuation; insertion loss is defined as P_{in}/P_{out} , all other values are relative to the passband mid-frequency.

SURFACE ACOUSTIC WAVE FILTER

The RW153A is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR system I as used in the United Kingdom.

QUICK REFERENCE DATA

		Frequency (MHz)	
Insertion loss		37.0	typ. 15 dB
Attenuation	reference at	37.0	0 dB
Vision carrier		39.5	typ. 6 dB
Sound carrier		33.5	typ. 20 dB
Adjacent vision trap		31.5	typ. 46 dB
Adjacent sound trap		41.5	typ. 50 dB
Operating temperature range			-10 to +70 °C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

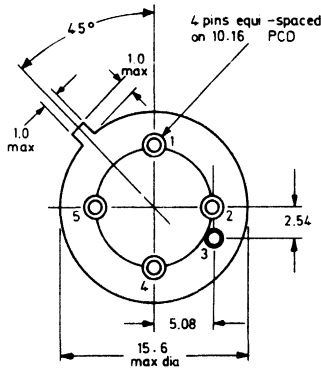


Fig. 1a Connections.

1. balanced output
2. input high
3. can earth
4. input earth
5. balanced output

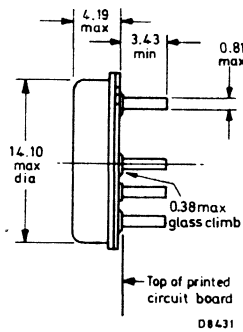
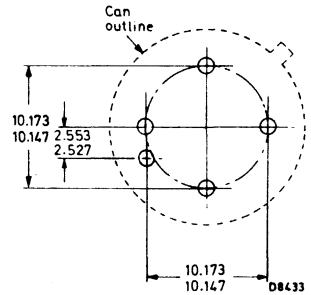


Fig. 1b Printed circuit board hole layout.

Standard 0.1" grid.
Hole dia. 1.2 mm min.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	10	V

CHARACTERISTICS

Test conditions: ambient temperature	25	°C
input drive impedance	50	Ω
load impedance (balanced)	300	Ω

	Frequency MHz	min.	typ.	max.
Insertion loss	37.0	-	15	- dB
Attenuation , reference at 37.0 MHz = 0 dB				
Vision carrier	39.5	5	6	7 dB
Chroma carrier	35.07	1	3	4 dB
Sound carrier	33.5	18	20	22 dB
Adjacent vision trap	31.5	40	46	- dB
Adjacent sound trap	41.5	46	50	- dB
Out of band response	10 to 60	38	-	- dB
	60 to 100	15	-	- dB
Pass band ripple (p-p)	36 to 38	-	0.5	1.0 dB
Group delay (relative to 0 ns at 39.5 MHz)	34.5 to 40.5			±40 ns
Spurious reflections and direct break through suppression	37.0	min.		40 dB
2Tsin ² pulse and bar k rating	39.5	max.		3 %
Temperature coefficient of frequency		typ.		-70 x 10 ⁻⁶ /K
Small-signal impedance				
input	37.0	typ.		1.4 kΩ//8.5 pF
output	37.0	typ.		1.5 kΩ//14 pF

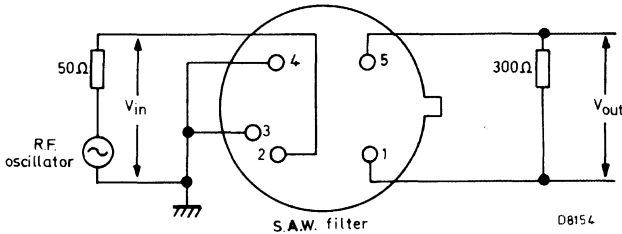
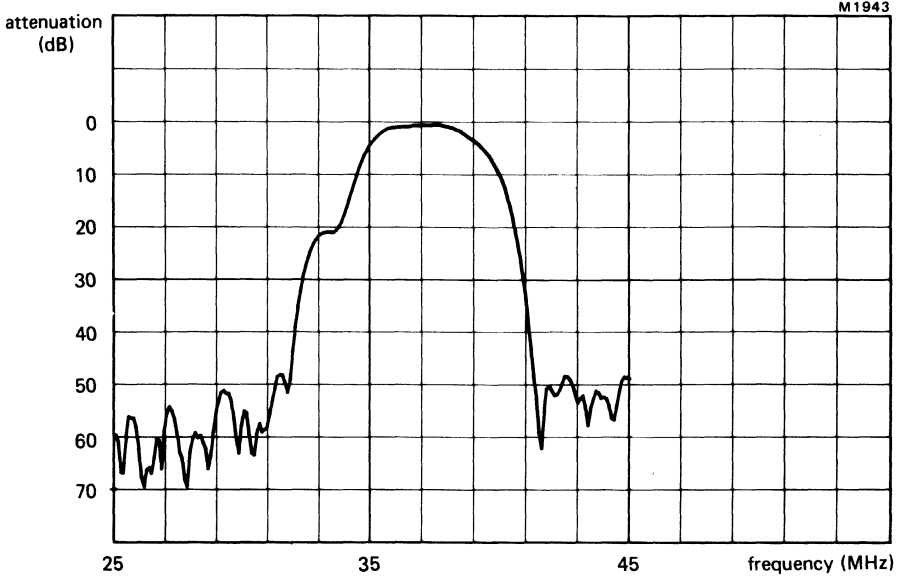
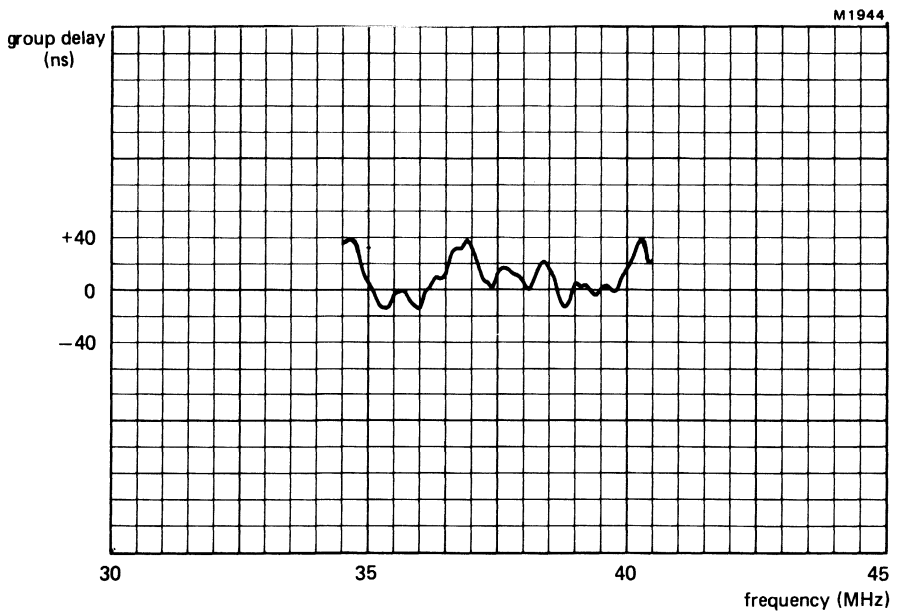


Fig.2 Test and basic application circuit

* For maximum operating life, the filter should be used with d.c. isolating capacitors.



Typical amplitude response (relative to 0 dB at 37.0 MHz)



Typical group delay (relative to 0 ns at 39.5 MHz)

SURFACE ACOUSTIC WAVE FILTER

The RW154 is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR system I as used in the United Kingdom.

QUICK REFERENCE DATA

	Frequency (MHz)		
Insertion loss	37.0	typ.	20 dB
Attenuation	reference at	37.0	0 dB
Vision carrier	39.5	typ.	6 dB
Sound carrier	33.5	typ.	20 dB
Adjacent vision trap	31.5	typ.	46 dB
Adjacent sound trap	41.5	typ.	50 dB
Operating temperature range			-10 to +70 °C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

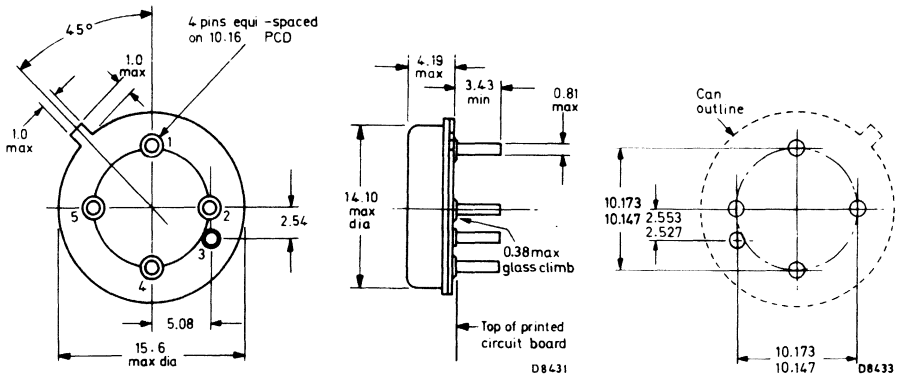


Fig. 1a Connections

1. balanced output
2. input high
3. can earth
4. input earth
5. balanced output

Fig. 1b Printed circuit board hole layout.

Standard 0.1" grid.
Hole dia. 1.2 mm min.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	30	V

CHARACTERISTICS

Test conditions:	ambient temperature	25	°C
	input drive impedance	50	Ω
	load impedance (balanced)	300	Ω

	Frequency	min.	typ.	max.
	MHz			
Insertion loss	37.0	-	20	- dB
Attenuation , reference at 37.0 MHz = 0 dB				
Vision carrier	39.5	5	6	7 dB
Chroma carrier	35.07	0	2	3 dB
Sound carrier	33.5	18	20	22 dB
Adjacent vision trap	31.5	40	46	- dB
Adjacent sound trap	41.5	46	50	- dB
Out of band response	10 to 60	38	-	- dB
	60 to 100	20	-	- dB
Pass band ripple (p-p)	36 to 38	-	0.5	1.0 dB
Group delay (relative to 0 ns at 37.0 MHz)	34.5 to 40.5			±40 ns
Spurious reflections and direct break through suppression	37.0	min.		40 dB
2Tsin ² pulse and bar k rating	39.5	max.		3%
Temperature coefficient of frequency		typ.		-90 x 10 ⁻⁶ /K
Small-signal impedance				
input	37.0	typ.		2.3 kΩ//5.5 pF
output	37.0	typ.		2.2 kΩ//11 pF

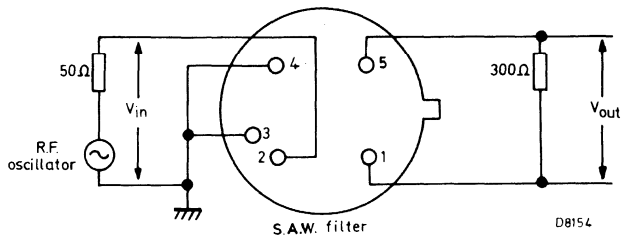
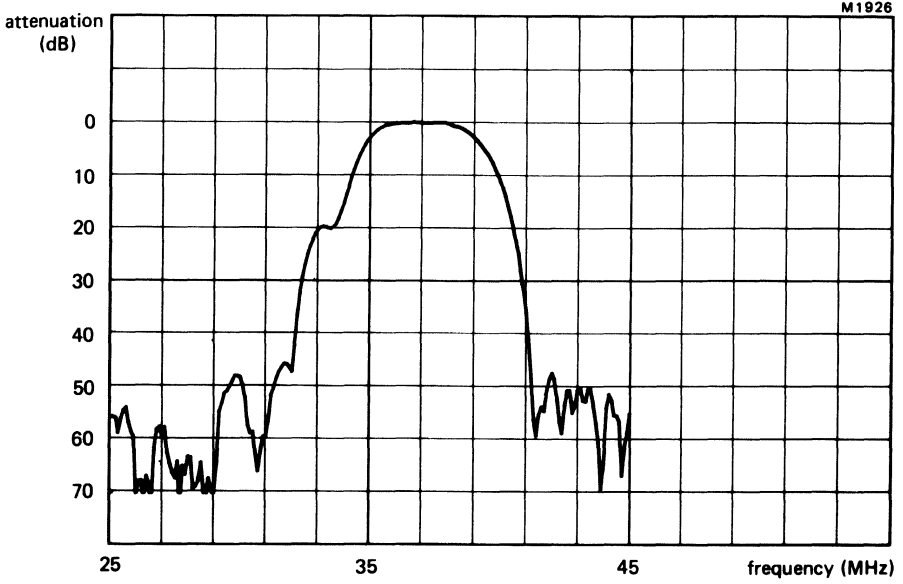
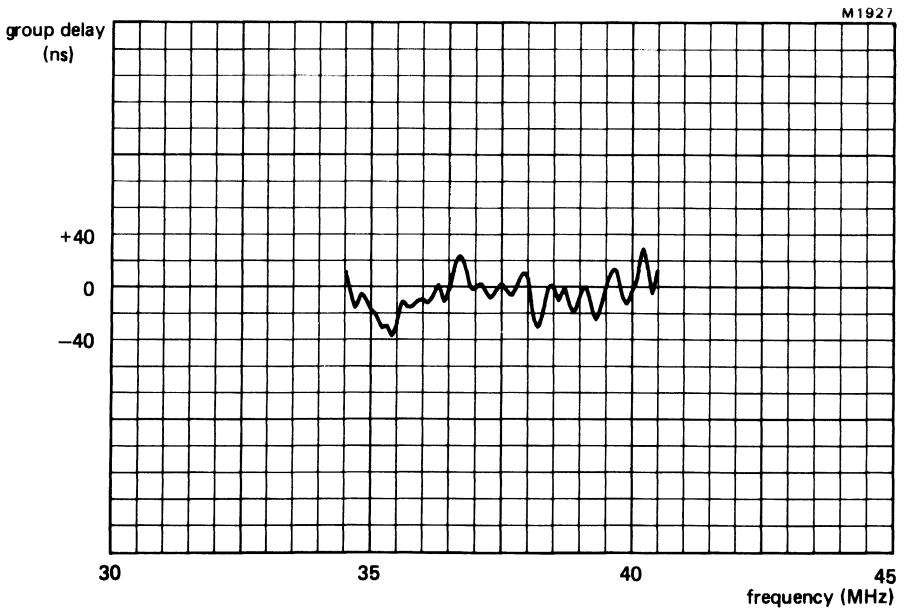


Fig.2 Test and basic application circuit

*For maximum operating life, the filter should be used with d.c. isolating capacitors



Typical amplitude response (relative to 0 dB at 37.0 MHz)



Typical group delay (relative to 0 ns at 39.5 MHz)

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max. *	30	V

CHARACTERISTICS

Test conditions:	ambient temperature	25	°C
	input drive impedance	50	Ω
	load impedance (balanced)	300	Ω

	Frequency MHz	min.	typ.	max.
Insertion loss	37.0	-	21	- dB
Attenuation, reference at 37.0 MHz = 0 dB				
Vision carrier	38.9	5	6	7 dB
Chroma carrier	34.47	1	2	4 dB
Sound carrier	33.4	17	19	21 dB
Adjacent vision trap	31.9	44	52	- dB
Adjacent sound trap, system B	40.4	48	58	- dB
Adjacent sound trap, system G	41.4	40	45	- dB
Out of band response	10 to 60	38	-	- dB
	60 to 100	20	-	- dB
Pass band ripple (p-p)	36 to 38	-	0.5	1.0 dB
Group delay (relative to 0 ns at 38.9 MHz)	34.1 to 39.4			see fig.4
Spurious reflections and direct break through suppression	37.0	min.		40 dB
2Tsin ² pulse and bar k rating	38.9	max.		3 %
Temperature coefficient of frequency		typ.		-90 x 10 ⁻⁶ /K
Small-signal impedance	input	37.0	typ.	3 kΩ/5.5 pF
	output	37.0	typ.	1.1 kΩ//15 pF

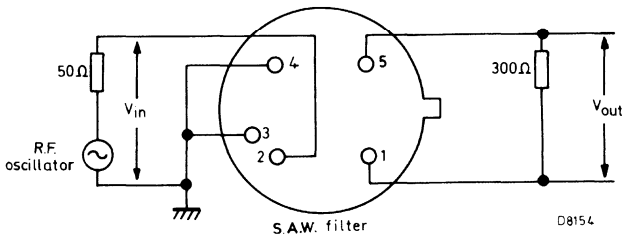


Fig.2 Test and basic application circuit

*For maximum operating life, the filter should be used with d.c. isolating capacitors.

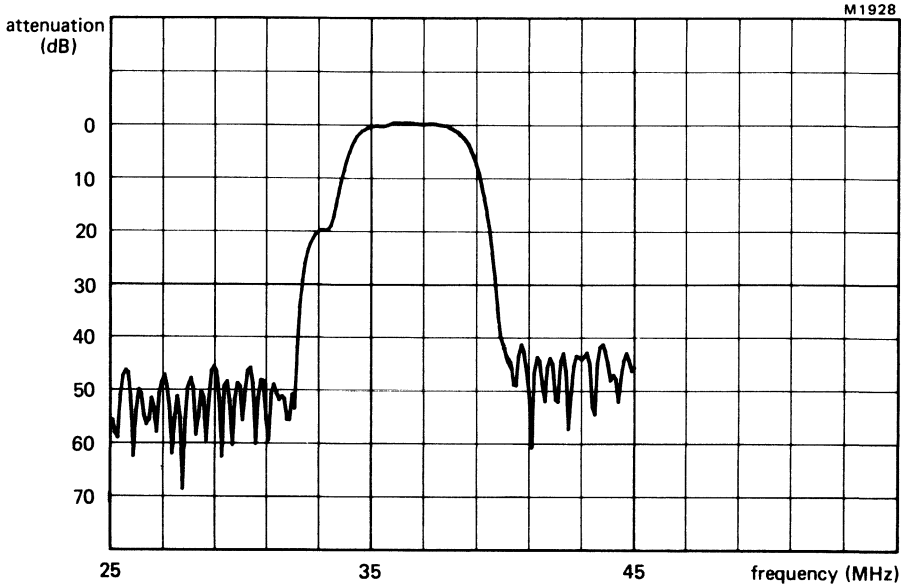


Fig.3 Typical amplitude response (relative to 0 dB at 37.0 MHz)

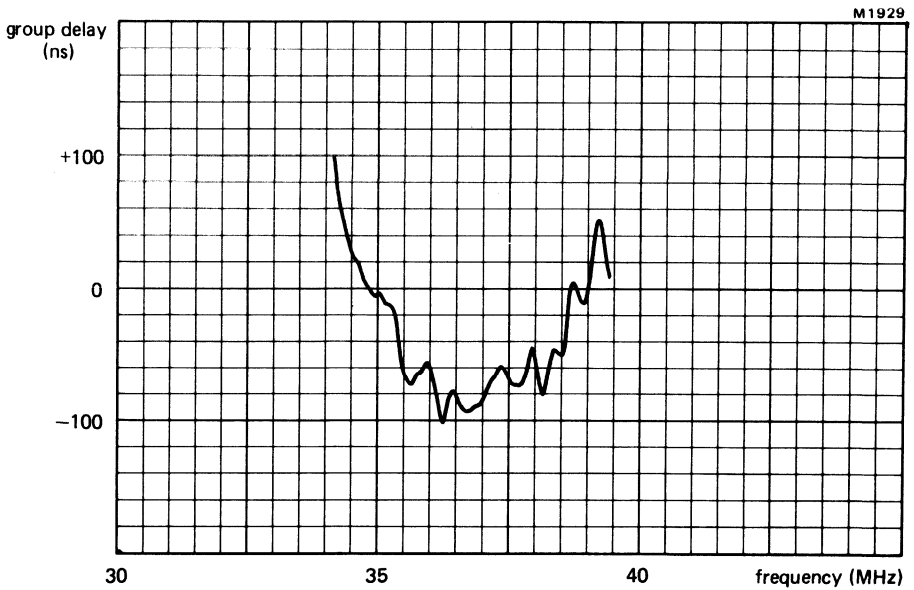


Fig.4 Typical group delay (relative to 0 ns at 38.9 MHz)

DEVELOPMENT SAMPLE DATA

This information is derived from development samples made available for evaluation. It does not necessarily imply that the device will go into regular production.

RW173A

SURFACE ACOUSTIC WAVE FILTER

The RW173A is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR systems B and G as used in many European countries.

QUICK REFERENCE DATA

	Frequency (MHz)			
Insertion loss	37.0	typ.	15	dB
Attenuation	reference at		0	dB
Vision carrier	38.9	typ.	6	dB
Sound carrier	33.4	typ.	19	dB
Adjacent vision trap	31.9	typ.	50	dB
Adjacent sound trap, system B	40.4	typ.	49	dB
Adjacent sound trap, system G	41.4	typ.	44	dB
Operating temperature range	41.4		-10 to +70	°C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

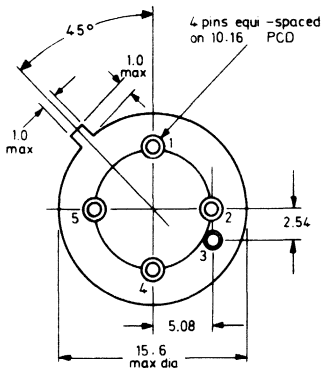


Fig. 1a Connections.

1. balanced output
2. input high
3. can earth
4. input earth
5. balanced output

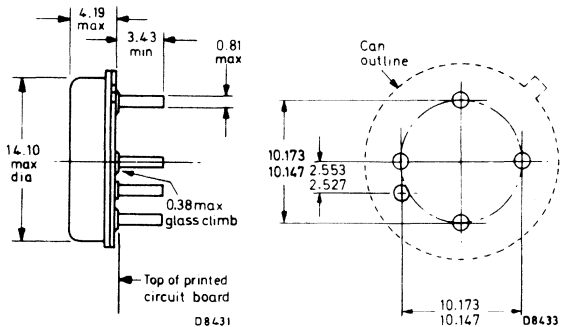


Fig. 1b Printed circuit board hole layout.

Standard 0.1" grid.
Hole dia. 1.2 mm min.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	10	V

CHARACTERISTICS

Test conditions:	ambient temperature	25	°C
	input drive impedance	50	Ω
	load impedance (balanced)	300	Ω

	Frequency MHz	min.	typ.	max.
Insertion loss	37.0	—	15	— dB
Attenuation , reference at 37.0 MHz = 0 dB				
Vision carrier	38.9	5	6	7 dB
Chroma carrier	34.47	0	2	3 dB
Sound carrier	33.4	17	19	21 dB
Adjacent vision trap	31.9	40	50	— dB
Adjacent sound trap, system B	40.4	46	49	— dB
Adjacent sound trap, system G	41.4	35	44	— dB
Out of band response	10 to 60	35	—	— dB
	60 to 100	15	—	— dB
Pass band ripple (p-p)	36 to 38	—	0.5	1.0 dB
Group delay (relative to 0 ns at 38.9 MHz)	34.2 to 39.4			see fig.4
Spurious reflections and direct break through suppression	37.0	min.		40 dB
2T sin ² pulse and bar k rating	38.9	max.		3 %
Temperature coefficient of frequency		typ.		-70 x 10 ⁻⁶ /K
Small-signal impedance				
input	37.0	typ.		1.3 kΩ//17 pF
output	37.0	typ.		1.1 kΩ//8.5pF

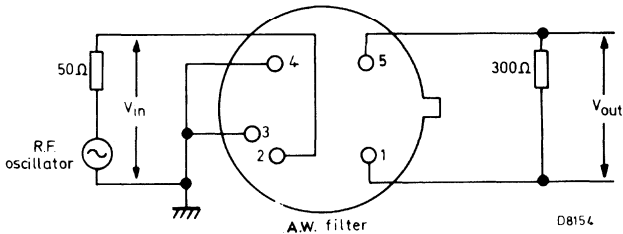


Fig.2 Test and basic application circuit

*For maximum operating life, the filter should be used with d.c. isolating capacitors.

DEVELOPMENT SAMPLE DATA

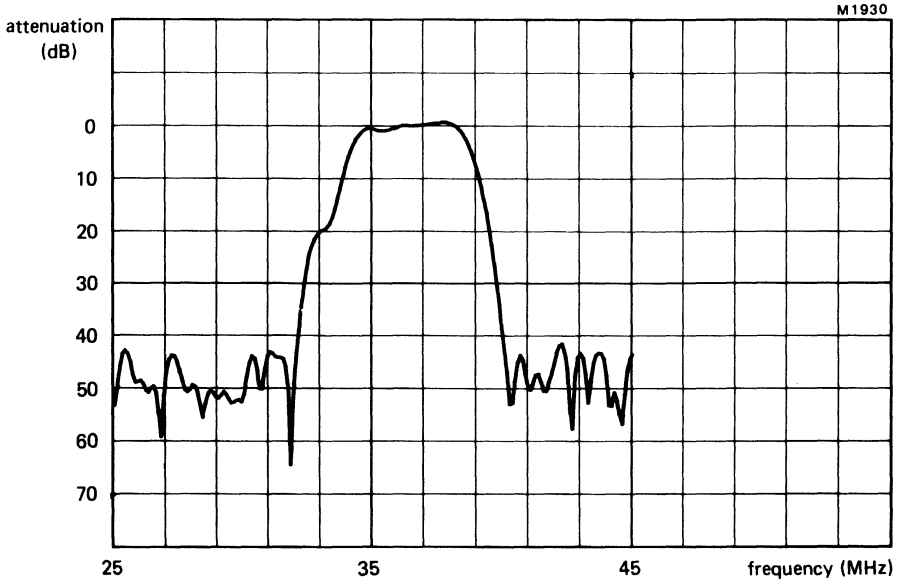


Fig.3 Typical amplitude response (relative to 0 dB at 37.0 MHz)

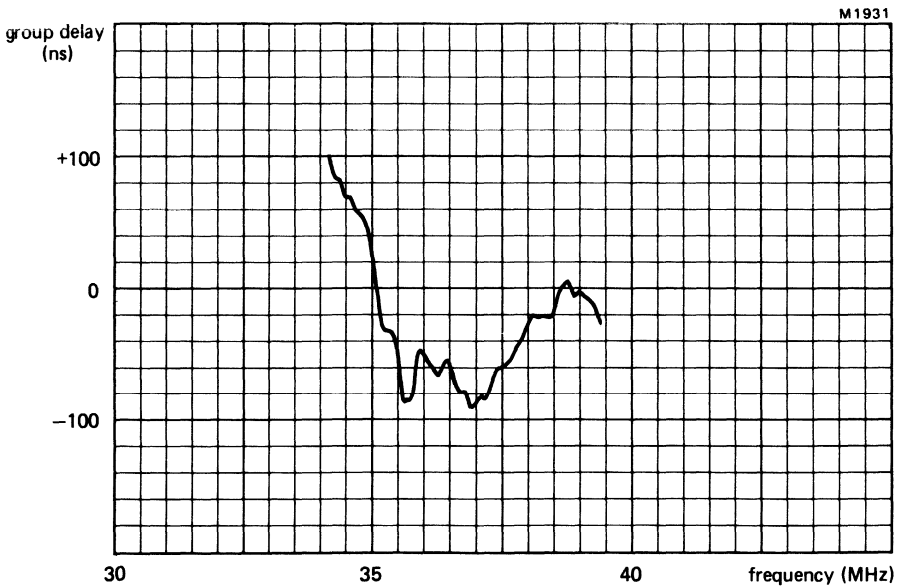


Fig.4 Typical group delay (relative to 0 ns at 38.9 MHz)



DEVELOPMENT SAMPLE DATA

This information is derived from development samples made available for evaluation. It does not necessarily imply that the device will go into regular production.

RW200

SURFACE ACOUSTIC WAVE FILTER

The RW200 is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR system M as used in the U.S.A.

QUICK REFERENCE DATA

	Frequency (MHz)		
Insertion loss	43.5	typ.	15 dB
Attenuation	reference at 43.5		0 dB
Vision carrier	45.75	typ.	5 dB
Sound carrier	41.25	typ.	16 dB
Adjacent vision trap	39.75	typ.	52 dB
Adjacent sound trap	47.25	typ.	47 dB
Operating temperature range			-10 to +70 °C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

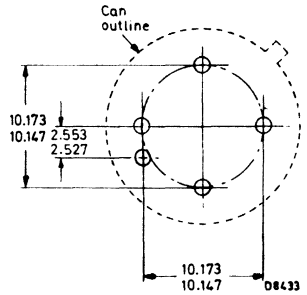
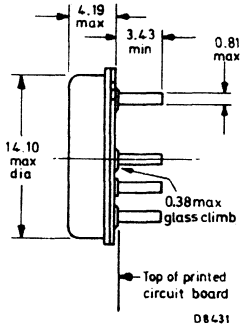
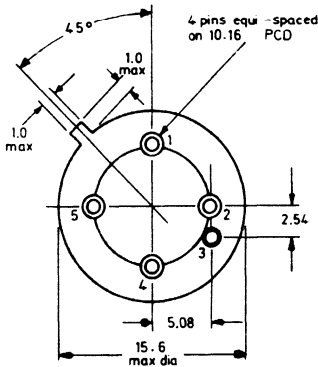


Fig. 1a Connections.

- 1. balanced output
- 2. input high
- 3. can earth
- 4. input earth
- 5. balanced output

Fig. 1b Printed circuit board hole layout.

Standard 0.1" grid.
Hole dia. 1.2 mm min.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	30	V

CHARACTERISTICS

Test conditions:	ambient temperature	25	°C
	input drive impedance	50	Ω
	load impedance (balanced)	300	Ω

	Frequency MHz	min.	typ.	max.
Insertion loss	43.5	-	15	- dB
Attenuation , reference at 43.5 MHz = 0 dB				
Vision carrier	45.75	4	5	6 dB
Chroma carrier	42.17	2	3	4 dB
Sound carrier	41.25	14	16	18 dB
Adjacent vision trap	39.75	50	52	- dB
Adjacent sound trap	47.25	45	47	- dB
Out of band response	10 to 55	40	-	- dB
Pass band ripple (p-p)	42.5 to 44.5	-	0.5	1.0 dB
Group delay (relative to 0 ns at 45.75 MHz)	42.0 to 46.0			see fig.4
Spurious reflections and direct break through suppression	43.5	min.		40 dB
2Tsin ² pulse and bar k rating	45.75	max.		3 %
Temperature coefficient of frequency		typ.		-90 x 10 ⁻⁶ /K
Small-signal impedance				
input	43.5	typ.		1.0 kΩ//16 pF
output	43.5	typ.		1.0 kΩ//9.0 pF

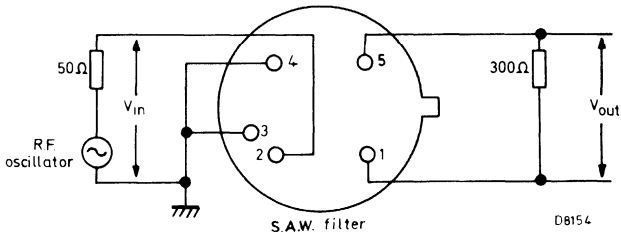


Fig.2 Test and basic application circuit.

*For maximum operating life, the filter should be used with d.c. isolating capacitors.

DEVELOPMENT SAMPLE DATA

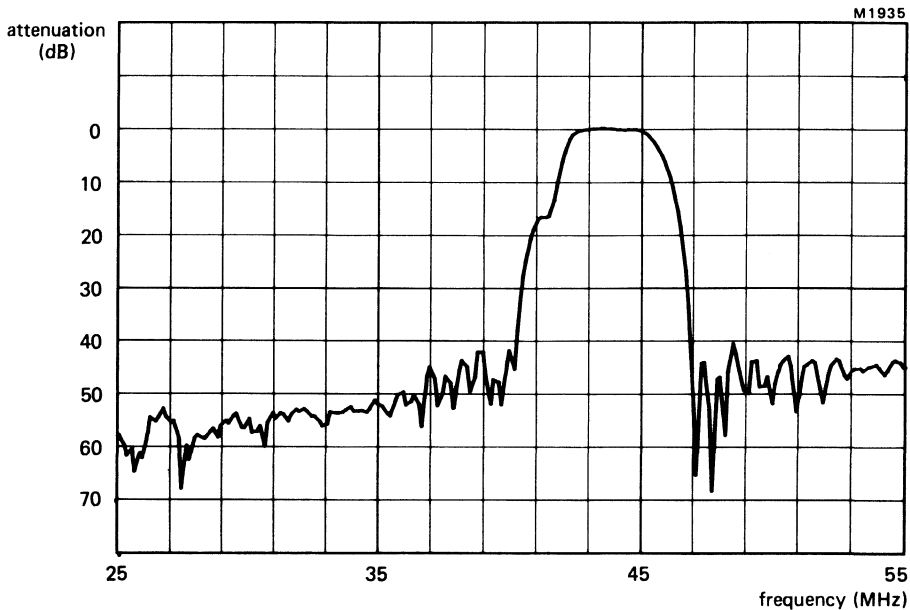


Fig.3 Typical amplitude response (relative to 0 dB at 43.5 MHz)

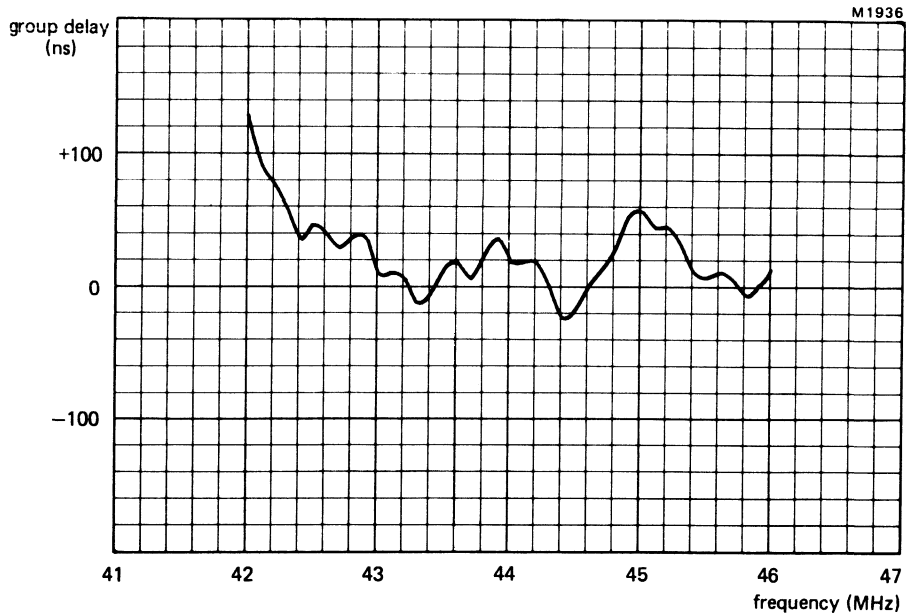


Fig.4 Typical group delay (relative to 0 ns at 35.75 MHz)

SURFACE ACOUSTIC WAVE FILTER

The RW300 is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR system L as used in France.

QUICK REFERENCE DATA

	Frequency (MHz)		
Insertion loss	37.0	typ.	21 dB
Attenuation	reference at 37.0		0 dB
Vision carrier	32.7	typ.	6 dB
Adjacent sound trap	31.2	typ.	44 dB
U.H.F. sound trap	39.2	typ.	42 dB
Operating temperature range			-10 to +70 °C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

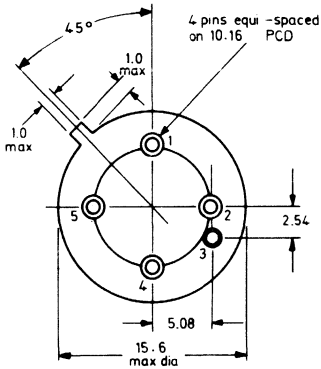


Fig. 1a Connections.

1. balanced output
2. input high
3. can earth
4. input earth
5. balanced output

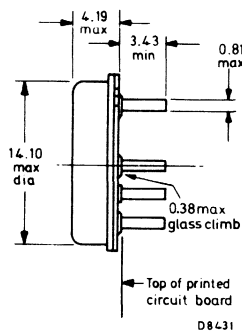
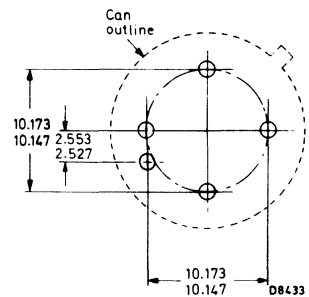


Fig. 1b Printed circuit board hole layout.

Standard 0.1" grid.
Hole dia. 1.2 mm min.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	30	V

CHARACTERISTICS

Test conditions:	ambient temperature	25	°C
	input drive impedance	50	Ω
	load impedance (balanced)	300	Ω

	Frequency MHz	min.	typ.	max.
Insertion loss	37.0	-	21	- dB
Attenuation , reference at 32.7 MHz = 0 dB				
Vision carrier	32.7	5	6	7 dB
Chroma carrier, fR	36.95	-	0	- dB
Chroma carrier, fB1	37.1	-	0	- dB
Adjacent sound trap	31.2	40	44	- dB
U.H.F. sound trap	39.2	40	42	- dB
Out of band response	10 to 50	35	-	- dB
Pass band ripple (p-p)	35 to 37	-	0.5	1.0 dB
Group delay (relative to 0 ns at 32.7 MHz)	32.0 to 37.2			±40 ns
Spurious reflections and direct break through suppression	37.0	min.		40 dB
2Tsin ² pulse and bar k rating	32.7	max.		3 %
Temperature coefficient of frequency		typ.		-90 x 10 ⁻⁶ /K
Small-signal impedance				
input	37.0	typ.		3.5 kΩ//6 pF
output	37.0	typ.		1.5 kΩ//12 pF

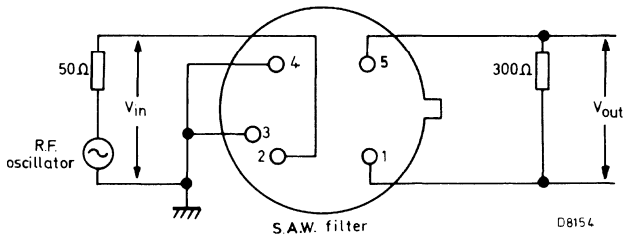
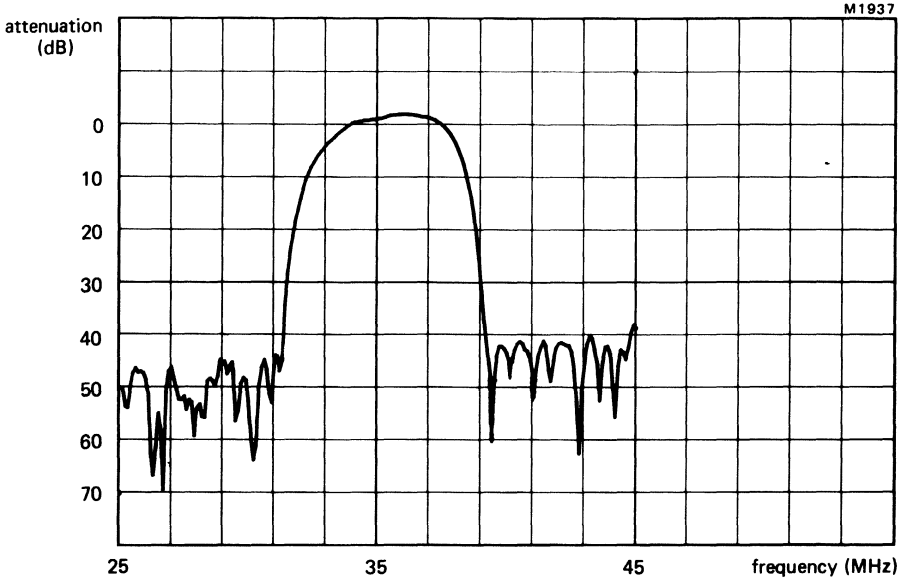
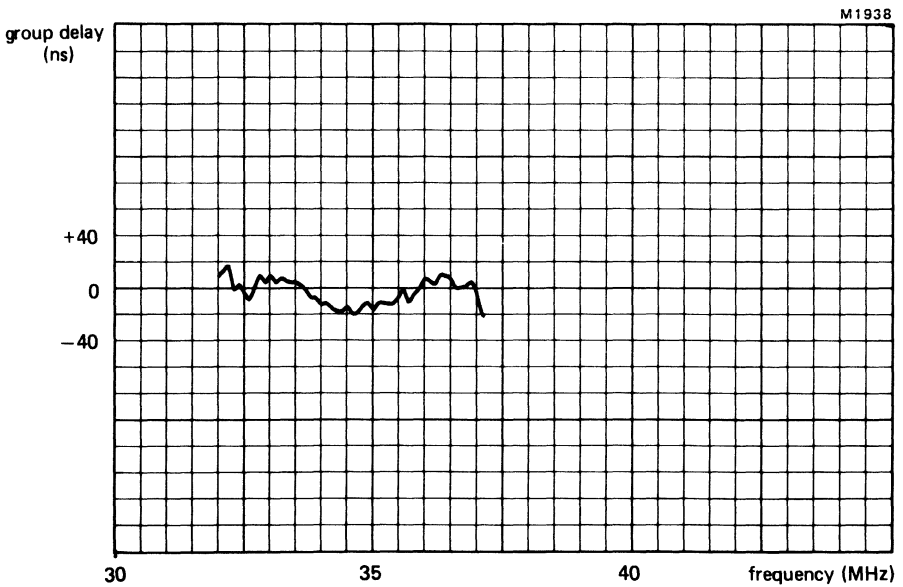


Fig.2 Test and basic application circuit

*For maximum operating life, the filter should be used with d.c. isolating capacitors.



Typical amplitude response (relative to 0 dB at 37.0 MHz)



Typical group delay (relative to 0 ns at 32.7 MHz)

SURFACE ACOUSTIC WAVE FILTER

The RW303 is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR system L as used in France.

QUICK REFERENCE DATA

		Frequency (MHz)		
Insertion loss		37.0	typ.	14 dB
Attenuation	reference at	37.0		0 dB
Vision carrier		32.7	typ.	6 dB
Adjacent sound trap		31.2	typ.	44 dB
U.H.F. sound trap		39.2	typ.	42 dB
Operating temperature range				-10 to +70 °C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

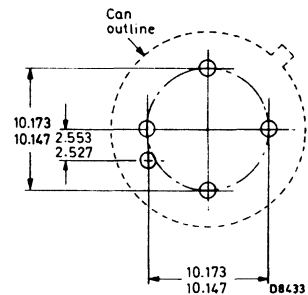
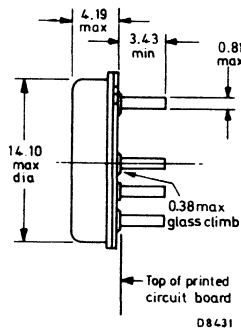
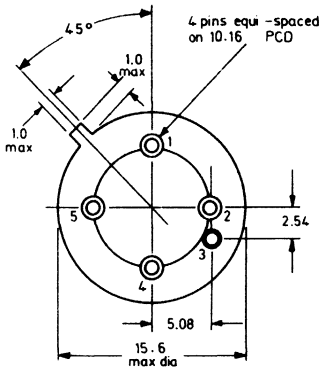


Fig. 1a Connections.

1. balanced output
2. input high
3. can earth
4. input earth
5. balanced output

Fig. 1b Printed circuit board hole layout.

Standard 0.1" grid.
Hole dia. 1.2 mm min.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	10	V

CHARACTERISTICS

Test conditions:	ambient temperature	25	°C
	input drive impedance	50	Ω
	load impedance (balanced)	300	Ω

	Frequency MHz	min.	typ.	max.
Insertion loss	37.0	—	14	— dB
Attenuation , reference at 37.0 MHz = 0 dB				
Vision carrier	32.7	5	6	7 dB
Chroma carrier, fR	36.95	—	0	— dB
Chroma carrier, fB1	37.1	—	0	— dB
Adjacent sound trap	31.2	40	44	— dB
U.H.F. sound trap	39.2	40	42	— dB
Out of band response	10 to 50	35	—	— dB
Pass band ripple (p-p)	35 to 37	—	0.5	1.0 dB
Group delay (relative to 0 ns at 32.7 MHz)	32.0 to 37.2			±40 ns
Spurious reflections and direct break through suppression	37.0	min.		40 dB
2Tsin ² pulse and bar k rating	32.7	max.		3 %
Temperature coefficient of frequency		typ.		-70 x 10 ⁻⁶ /K
Small-signal impedance				
input	37.0	typ.	2.0 kΩ//7 pF	
output	37.0	typ.	1.0 kΩ//16 pF	

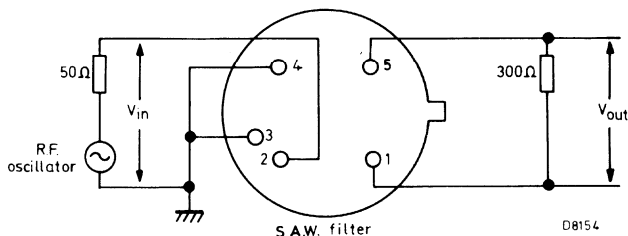
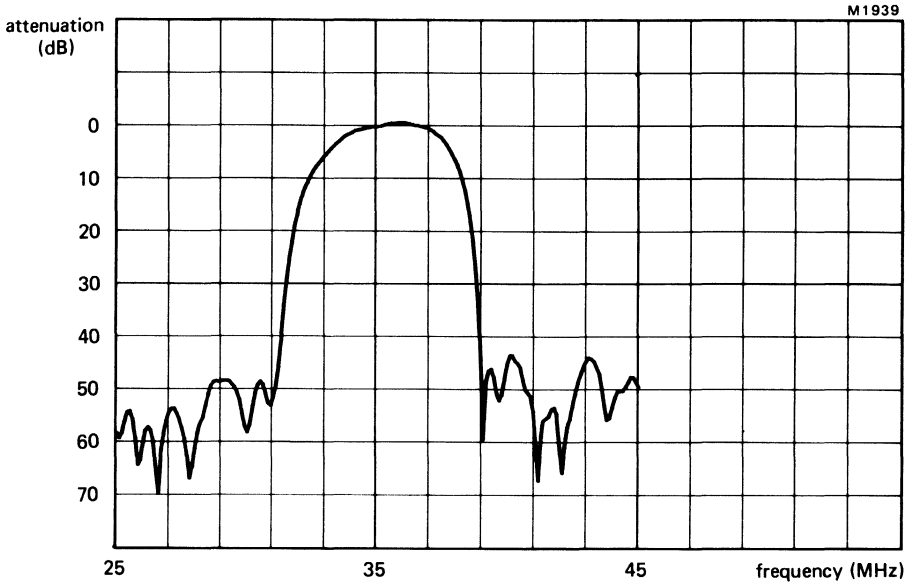
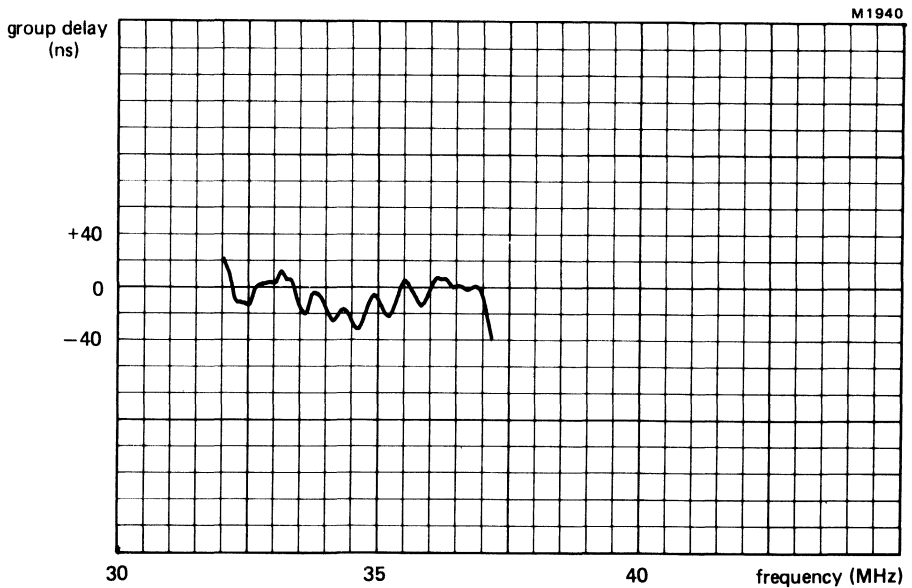


Fig.2 Test and basic application circuit

*For maximum operating life, the filter should be used with d.c. isolating capacitors.



Typical amplitude response (relative to 0 dB at 37.0 MHz)



Typical group delay (relative to 0 ns at 32.7 MHz)

SURFACE ACOUSTIC WAVE FILTER

The RW400 is a lithium niobate surface wave device for use as an i.f. bandpass filter in colour and monochrome TV receivers. It is specifically designed for CCIR system D as used in China.

QUICK REFERENCE DATA

	Frequency (MHz)		
Insertion loss	34,0	typ.	19 dB
Attenuation	reference at 34,0		0 dB
Vision carrier	37,0	typ.	6 dB
Sound carrier	30,5	typ.	21 dB
Adjacent vision trap	29,0	typ.	44 dB
Adjacent sound trap	38,5	typ.	40 dB
Operating temperature range			-10 to +70 °C

MECHANICAL DATA

Dimensions in mm

5-lead TO-8.

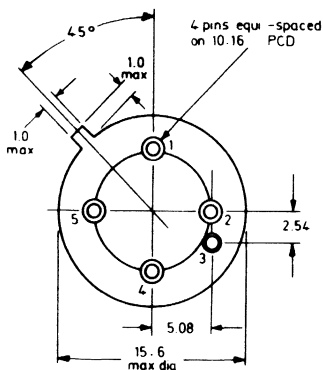


Fig. 1a Connections.

1. balanced output
2. input high
3. can earth
4. input earth
5. balanced output

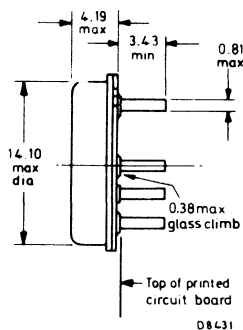
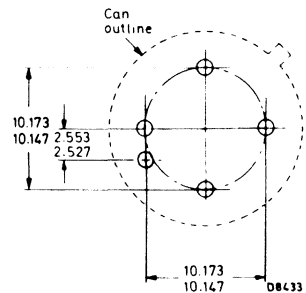


Fig. 1b Printed circuit board hole layout.

Standard 0,1" grid.
Hole dia. 1,2 mm min.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	10	V

CHARACTERISTICS

Test conditions: ambient temperature	25	°C
input drive impedance	50	Ω
load impedance (balanced)	300	Ω

	Frequency MHz			
		min.	typ.	max.
Insertion loss	34.0	-	19	- dB
Attenuation , reference at 34.0 MHz = 0 dB				
Vision carrier	37.0	5	6	7 dB
Chroma carrier	32.5	0	0.5	2 dB
Sound carrier	30.5	18	21	24 dB
Adjacent vision trap	29.0	38	44	- dB
Adjacent sound trap	38.5	37	40	- dB
Out of band response	25 to 28.8	34	-	- dB
	38.7 to 43	34	-	- dB
Pass band ripple (p-p)	33 to 35	-	0.5	1.0 dB

Group delay (relative to 0 ns at 37.0 MHz)	31.3 to 37.3		±50 ns
Spurious reflections and direct break through suppression	34.0	min.	40 dB
2Tsin ² pulse and bar k rating	37.0	max.	3 %
Temperature coefficient of frequency		typ.	-70 × 10 ⁻⁶ /K
Small-signal impedance			
input	34.0	typ.	2.5 kΩ//14 pF
output	34.0	typ.	1.5 kΩ//7.5 pF

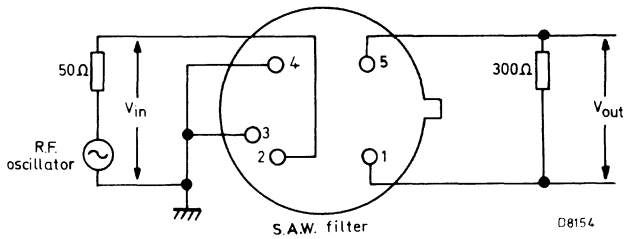
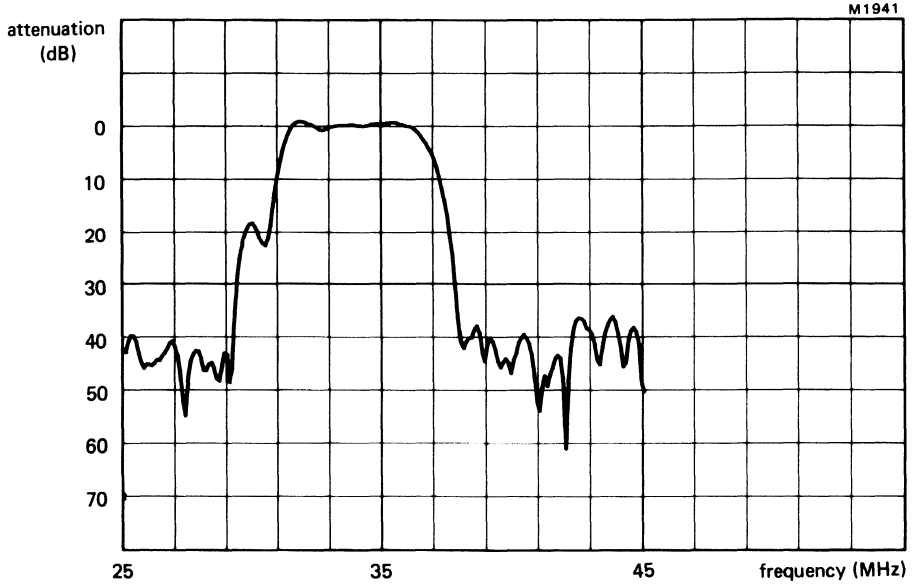
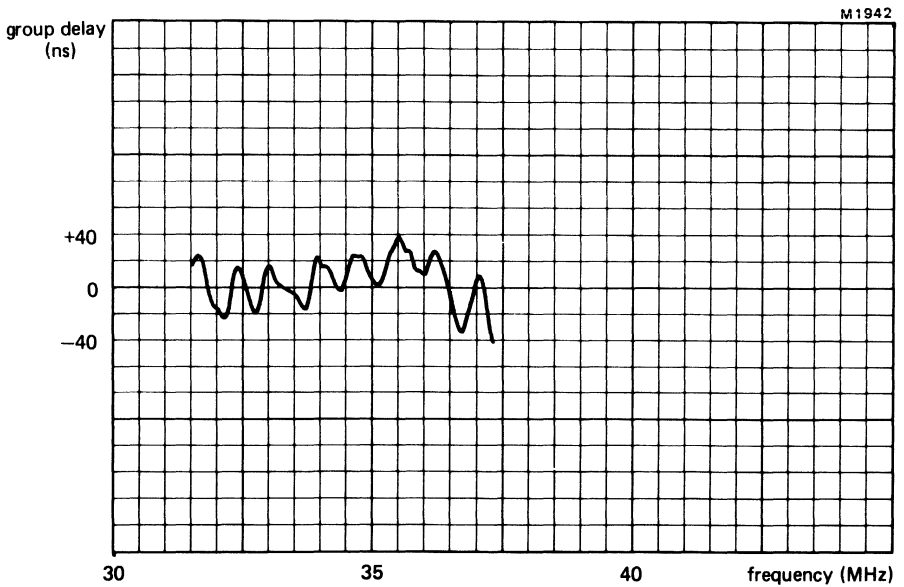


Fig.2 Test and basic application circuit

*For maximum operating life, the filter should be used with d.c. isolating capacitors.



Typical amplitude response (relative to 0 dB at 34.0 MHz)



Typical group delay (relative to 0 ns at 37.0 MHz)

Split sound and vision filters

DEVELOPMENT SAMPLE DATA

This information is derived from development samples made available for evaluation. It does not necessarily imply that the device will go into regular production.

RW180

SURFACE ACOUSTIC WAVE FILTER

The RW180 is a lithium niobate surface wave device of the split sound class for use as an i.f. bandpass filter in high quality sound colour TV receivers. It is specifically designed for CCIR systems B and G in high performance receivers with dual sound capability.

QUICK REFERENCE DATA

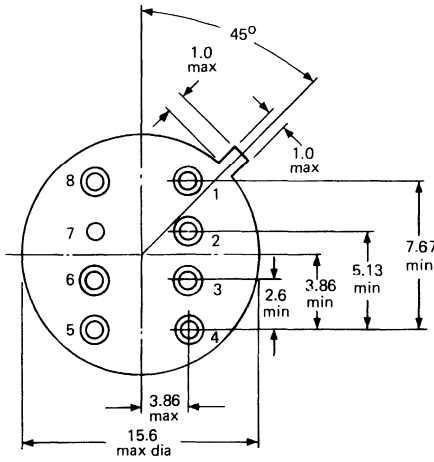
		Frequency (MHz)		
VISION OUTPUT				
Insertion loss		37.0	typ. 22	dB
Attenuation	reference at	37.0	0	dB
Vision carrier		38.9	typ. 6	dB
Sound carrier		33.4	typ. 46	dB
Adjacent vision trap		31.9	typ. 54	dB
Adjacent sound trap		40.4	typ. 50	dB
SOUND OUTPUT				
Insertion loss		33.4	typ. 20	dB
Attenuation	reference at	37.0	0	dB
			on vision output	
Sound carrier		33.4	typ. 0	dB
Adjacent sound trap		40.4	typ. 40	dB
Operating temperature range			-10 to +70	°C

MECHANICAL DATA

see page 42

MECHANICAL DATA

Dimensions in mm



M1965

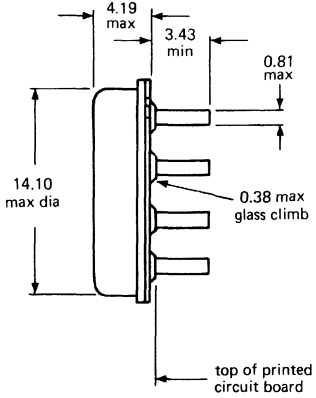
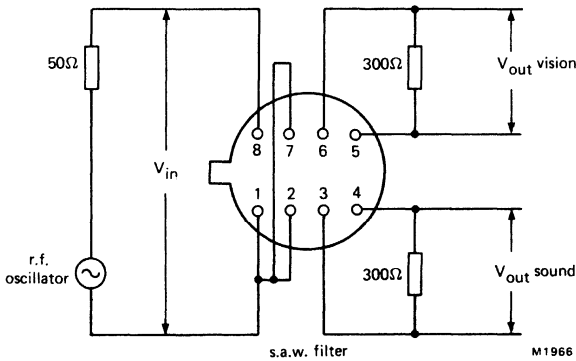


Fig. 1a Connections

Fig. 1b Printed circuit board hole layout.

1. input low
2. earth
3. balanced sound output
4. balanced vision output
5. balanced vision output
6. earth
7. earth
8. input high

Standard 0.1" grid.
Hole dia. 1.2 mm min.



M1966

Fig. 2 Test and basic application circuit

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70	°C
Storage temperature	-25 to +85	°C
Pin to pin voltage (short term) max.*	30	V

CHARACTERISTICS

Test conditions: ambient temperature	25	°C
input drive impedance	50	Ω
load impedance (balanced)	300	Ω

VISION OUTPUT

DEVELOPMENT SAMPLE DATA

	Frequency MHz	min.	typ.	max.	
Insertion loss	37.0	-	22	-	dB
Attenuation reference at 37.0 MHz = 0 dB					
Vision carrier	38.9	5	6	7	dB
Chroma carrier	34.47	1	3	4	dB
Sound carrier	33.4	32	46	-	dB
Adjacent vision trap	31.9	46	54	-	dB
Adjacent sound trap	40.4	46	50	-	dB
Out of band response	10 to 60	36	-	-	dB
	60 to 100	16	-	-	dB
Pass band ripple (p-p)	36 to 38	-	0.5	1.0	dB
Group delay (relative to 0 ns at 38.9 MHz)	34.4 to 39.7				see fig.5
Spurious reflections and direct break through suppression	38.9	min.		40	dB
2Tsin ² pulse and bar k rating	38.9	max.		3	%
Temperature coefficient of frequency		typ.	-90 x 10 ⁻⁶		/K
Small-signal impedance	input	37.0	typ.	1.1 kΩ//9	pF
	output	37.0	typ.	1.7 kΩ//15	pF

SOUND OUTPUT

		min.	typ.	max.	
Insertion loss	33.4	-	20	-	dB
Attenuation , reference at 37.0 MHz = 0 dB on vision output					
Vision carrier	38.9	3	4	5	dB
Sound carrier	33.4	-2	0	2	dB
Adjacent sound trap	40.4	32	40	-	dB
In-band trap	37.0	18	20	-	dB
Out of band response	10 to 60	32	-	-	dB
	60 to 100	16	-	-	dB
Small-signal output impedance	33.4	typ.	1.0 kΩ//16		pF

*For maximum operating life, the filter should be used with d.c. isolating capacitors.

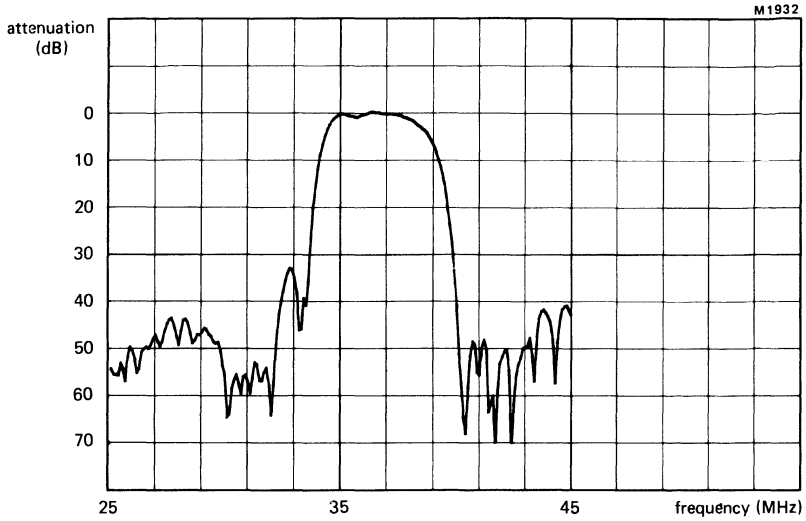


Fig.3 VISION Typical amplitude response (relative to 0 dB at 37.0 MHz)

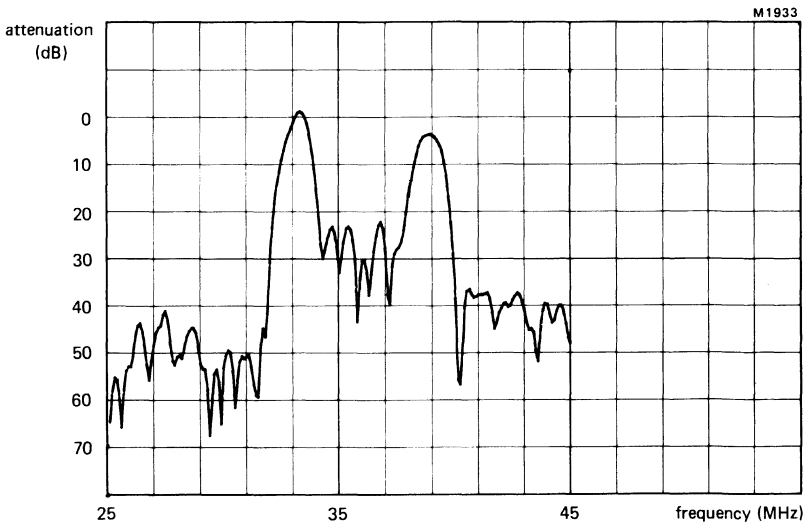


Fig.4 SOUND Typical amplitude response (relative to 0 dB on VISION)

DEVELOPMENT I SAMPLE DATA

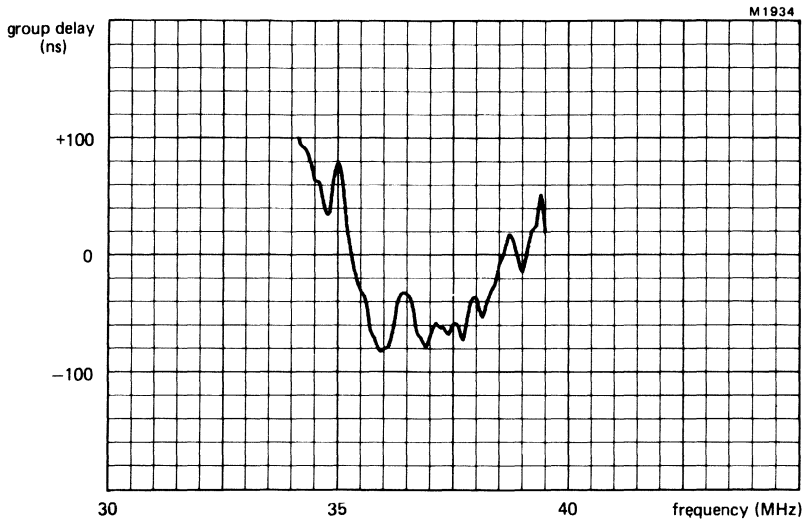


Fig.5 VISION Typical group delay (relative to 0 ns at 38.9 MHz)

Satellite filters

DEVELOPMENT SAMPLE DATA

This information is derived from development samples made available for evaluation. It does not necessarily imply that the device will go into regular production.

SWF134-28
SWF134-30

SURFACE ACOUSTIC WAVE FILTERS

The SWF134-28 and SWF134-30 are linear phase surface wave filters for use in the i.f. service of satellite TV receivers.

QUICK REFERENCE DATA

	SWF134-28	SWF134-30
Nominal centre frequency	134 MHz	134 MHz
Bandwidth (-1 dB)	28 MHz	30 MHz
Passband ripple, amplitude	< 1 dB (p-p)	< 1 dB (p-p)
Passband ripple, group delay	typ. 20 ns (p-p)	typ. 20 ns (p-p)
Insertion loss (50 Ω source and load)	typ. 28 dB	typ. 28 dB
Stopband suppression for frequencies > 10 MHz away from passband	typ. -28 dB	typ. -28 dB
Package	5-load TO-8	5-lead TO-8

MECHANICAL DATA

5-load TO-8

Dimensions in mm

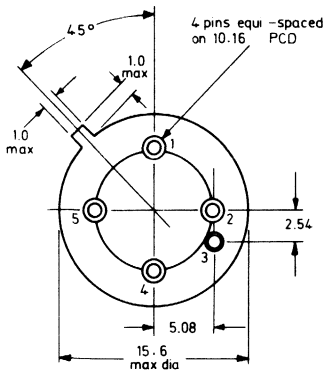


Fig. 1a Connections.
1. balanced output
2. input high
3. can (earth)
4. input (earth)
5. balanced output

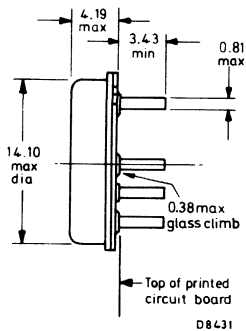
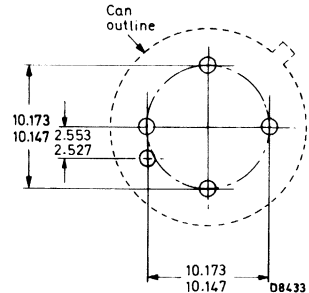


Fig. 1b Printed circuit board hole layout.
Standard 0,1" grid.
Hole dia. 1,2 mm min.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	-10 to +70 °C
Storage temperature	-25 to +85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	25 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Amplitude response

	frequency MHz	amplitude dB
Stopband suppression	115	typ. -28
	120	typ. -3
	124 to 144	± 1
	148	± 1
	153	typ. -28
Out of band response	80 to 115	typ. -28
	153 to 160	typ. -28

2. SPECIAL PURPOSE FILTERS

Transmitter and transposer filters for television

SURFACE ACOUSTIC WAVE FILTERS

for professional tv applications

This range of surface acoustic wave filters for professional tv transmission applications provides a cost effective and compact alternative to conventional i.f. filtering.

The main features of these high performance devices are:

- low passband and group delay ripple
- high stability
- high sideband suppression

SURVEY

type number	CCIR system	application	vision carrier frequency MHz	remarks
RW651	B/G	transposer	38,9	
RW652	B/G	transmitter	38,9	
RW661	I	transposer	39,5	very low passband and group delay ripple
RW662	I	transposer	38,9	complementary pair for sound and vision
RW663	I	transposer	32,9*	
RW664	I	transmitters	38,9	controlled h.f. roll-off
RW671	M	transmitters	45,75	
RW672	M	transmitters	38,9	non-standard i.f.
RW681	D/K	transmitters	38,9	

Package

24-lead hermetic metal DIL.

* Sound carrier frequency.

Test conditions

Source and load impedance	50 Ω
Measurement temperature	23 $^{\circ}\text{C}$
Design temperature	65 \pm 5 $^{\circ}\text{C}$

Note

Professional applications demand close limits on the passband response, particularly on the position of the vision carrier. To maintain these characteristics the filters are designed for temperature-controlled operation. The temperature coefficient is $-75 \times 10^{-6}/\text{K}$, which is equivalent to a frequency shift of 120 kHz at 38,9 MHz for a temperature change from 23 $^{\circ}\text{C}$ to 65 $^{\circ}\text{C}$.

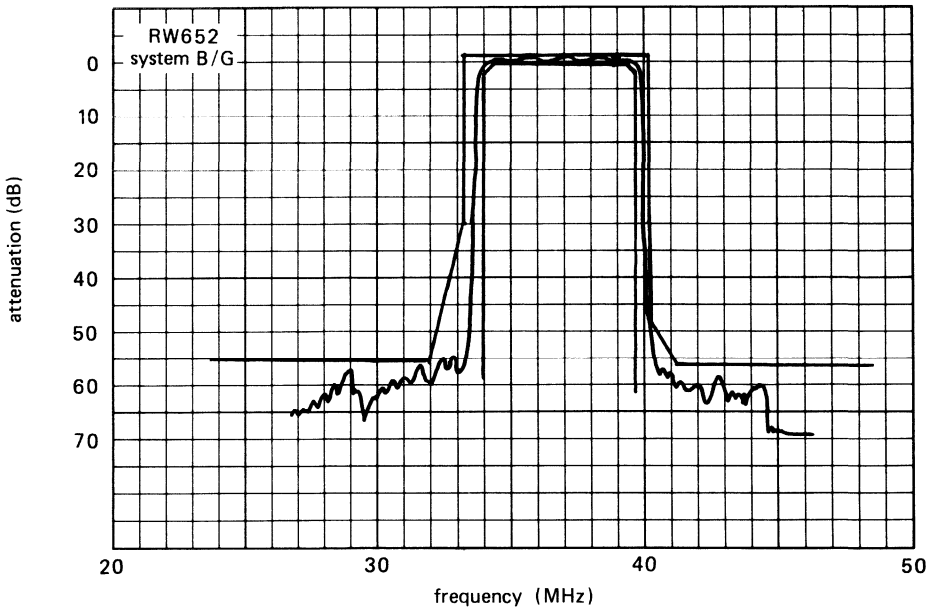
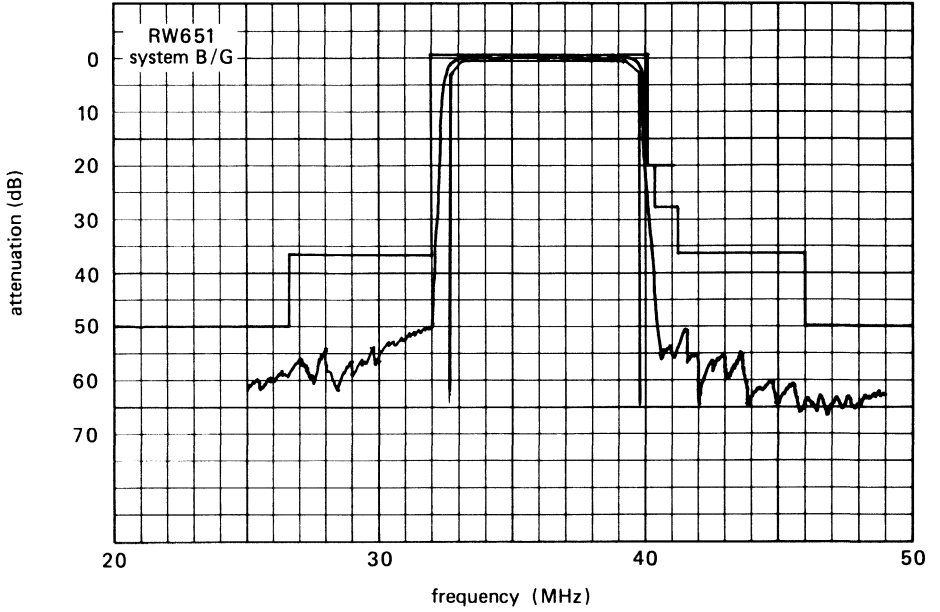
CHARACTERISTICS

type number	carrier frequency MHz	passband frequency ¹ MHz	insertion loss		passband ripple		group delay ripple		min. sideband suppression dB
			typ. dB	max. dB	typ. dB	max. dB	typ. ns (p-p)	max. ns (p-p)	
RW651	38,9	32,9 – 39,6	28	29	\pm 0,2	\pm 0,3	40	60	50
RW652	38,9	34,3 – 39,6	24	25	\pm 0,3	\pm 0,5	—	60	50
RW661	39,5	32,8 – 40,3	27	28	\pm 0,15	\pm 0,3	40	60	55
RW662	38,9	33,7 – 39,8	26	27	\pm 0,2	\pm 0,5	50	60	55
RW663	32,9 ²	32,8 – 33,2	28	30	\pm 0,5	\pm 1,0	—	100	50
RW664	38,9	34,2 – 39,5	28	29	\pm 0,2	\pm 0,5	55	65	50
RW671 ^{3*}	45,75	41,5 – 46,5	25	26	\pm 0,4	\pm 0,5	40	60	50
RW672	38,9	35,0 – 39,5	22	23	\pm 0,2	\pm 0,5	70	90	50
RW681	38,9	33,2 – 39,6	27	28	\pm 0,2	\pm 0,5	40	50	50

¹ Measured at 1 dB attenuation

² Sound carrier frequency.

³ Measured with 25 Ω source and load impedance.



SURFACE ACOUSTIC WAVE FILTER

The RW651 is a surface acoustic wave i.f. bandpass filter for use in high performance system B/G transposer and r.f. converter applications. It has low amplitude and group delay ripple.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 32,8 to 39,7 MHz
Passband amplitude ripple (p-p)	typ. 0,4 dB
Passband group delay ripple (p-p)	typ. 40 ns
Insertion loss (50 Ω source and load)	typ. 28 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

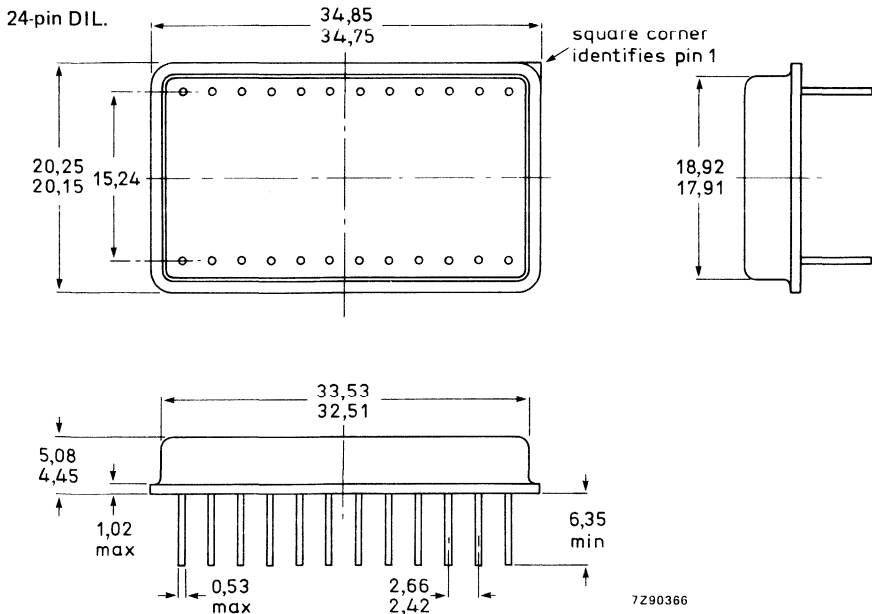


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to + 70 °C
Storage temperature range	-25 to + 85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 38,9 MHz at the design temperature would be measured at 39,0 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 39,0 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	typ. 32,9 to 39,6	
Passband amplitude ripple (p-p)		typ. 0,4; max. 0,6
Adjacent channel trap	$31,5 \pm 0,6$	max. -36
Adjacent channel trap	$41,4 \pm 0,2$	max. -36
Stopband	d.c. to 26,5	min. 50
Stopband	46,0 to 100	min. 50

General

Insertion loss	typ. 28 dB; max. 29 dB
Passband group delay	typ. 3600 ns
Passband group delay ripple (p-p)	typ. 40 ns; max. 60 ns

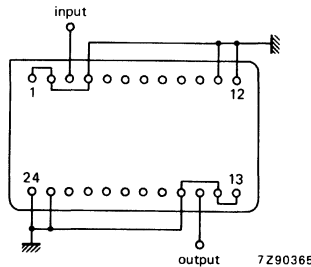


Fig. 2.

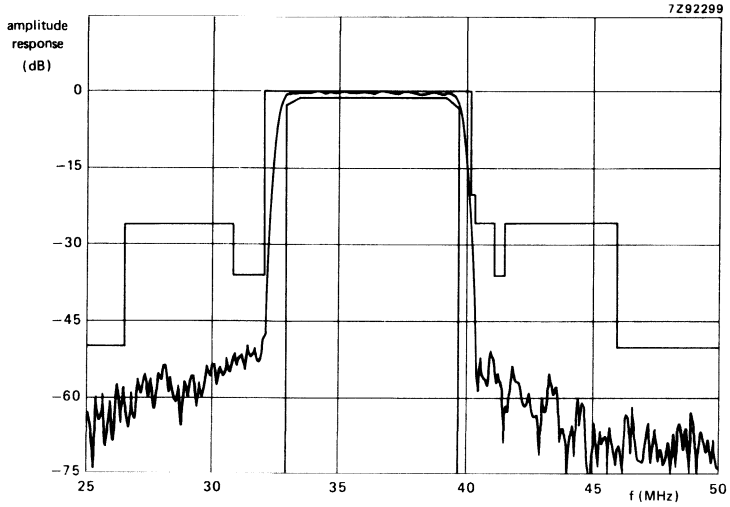


Fig. 3.

SURFACE ACOUSTIC WAVE FILTER

The RW652 is a surface acoustic wave filter for use in high performance system B/G TV modulators and transmitters with separate sound processing.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 34,3 to 39,6 MHz
Passband amplitude ripple (p-p)	typ. 0,6 dB
Passband group delay ripple (p-p)	max. 60 ns
Insertion loss (50 Ω source and load)	typ. 24 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

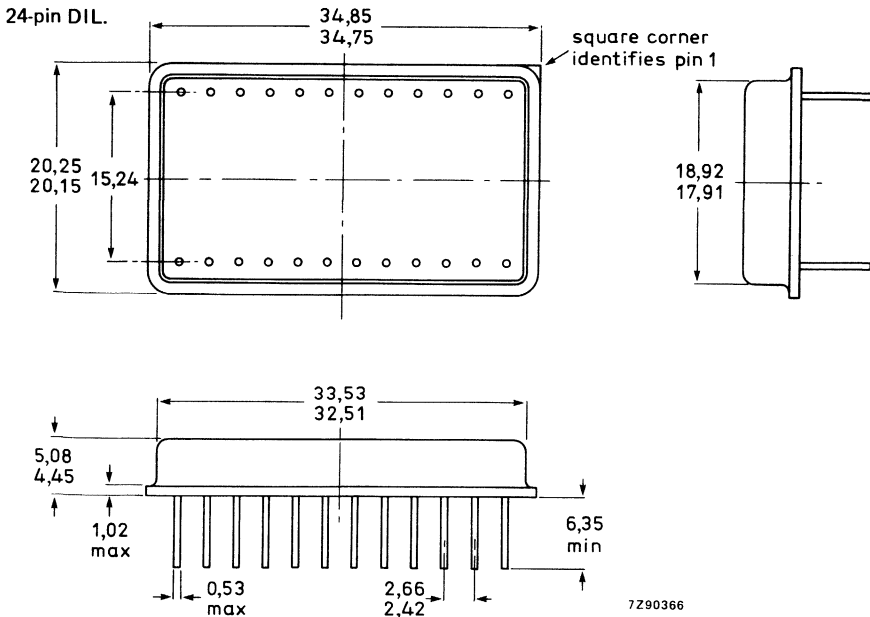


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to +70 °C
Storage temperature range	-25 to +85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 37,4 MHz at the design temperature would be measured at 37,5 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 37,5 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	typ. 34,4 to 39,5	
Passband amplitude ripple (p-p)		typ.0,6; max. 1,0
Amplitude	33,5; 40,25	max. -30
Amplitude	40,5	max. -46
Stopband	d.c. to 32,0	min. 50
Stopband	41,5 to 100	min. 50

General

Insertion loss	typ. 24 dB; max. 25 dB
Passband group delay	typ. 3600 ns
Passband group delay ripple (p-p)	max. 60 ns

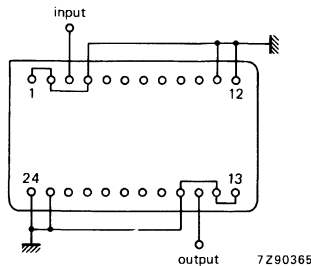


Fig. 2.

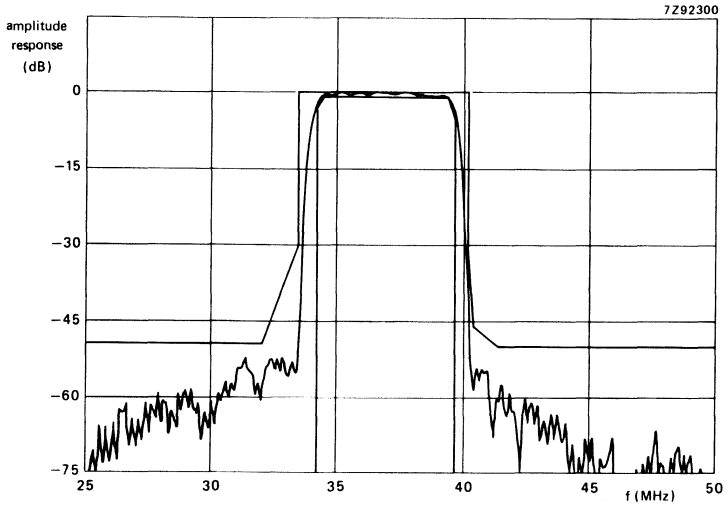


Fig. 3.

SURFACE ACOUSTIC WAVE FILTER

The RW661 is a surface acoustic wave i.f. bandpass filter for use in high performance system I transposer and r.f. converter applications. The extremely low passband ripple, deep stopband level and controlled transition band response together provide a filter of outstanding performance.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 32,8 to 40,3 MHz
Passband amplitude ripple (p-p)	typ. 0,3 dB
Passband group delay ripple (p-p)	typ. 40 ns
Insertion loss (50 Ω source and load)	typ. 27 dB
Stopband suppression	typ. 55 dB
Design operating temperature	33 °C
Operating temperature range	-10 to + 70 °C

MECHANICAL DATA

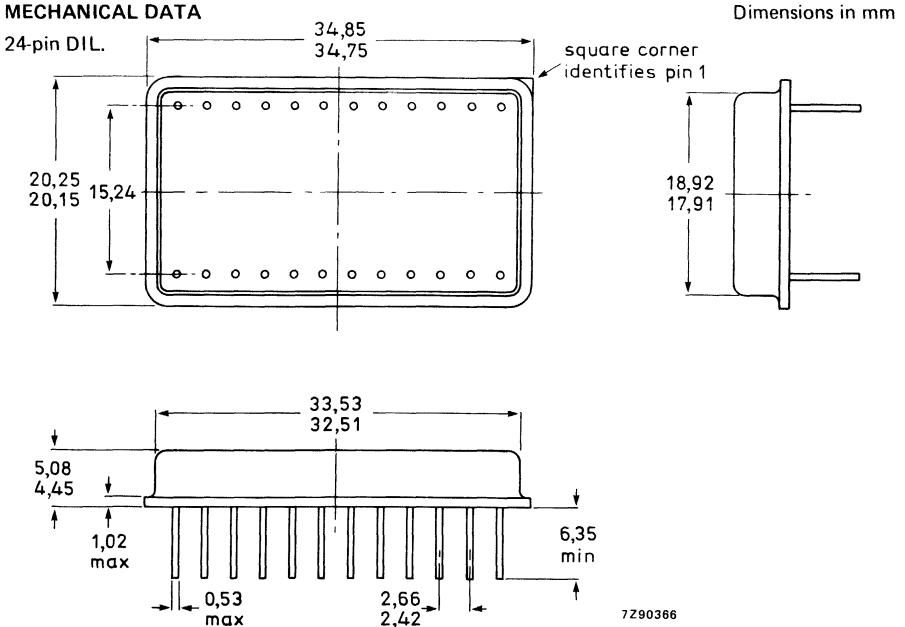


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to +70 °C
Storage temperature range	-25 to +85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 33 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 39,47 MHz at the design temperature would be measured at 39,5 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 39,5 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	typ. 33,0 to 40,1	
Passband amplitude ripple (p-p)		typ. 0,3; max. 0,6
Adjacent channel trap	31,5 ± 0,1	max. -55
Adjacent channel trap	41,5 ± 0,1	max. -55
Stopband	d.c. to 31,4	min. 50
Stopband	41,6 to 100	min. 50

General

Insertion loss	typ. 27 dB; max. 28 dB
Passband group delay	typ. 3600 ns
Passband group delay ripple (p-p)	typ. 40 ns; max. 60 ns

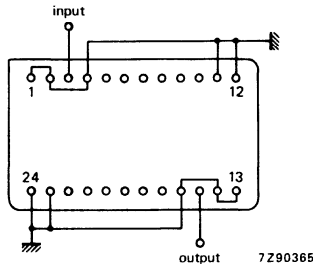


Fig. 2.

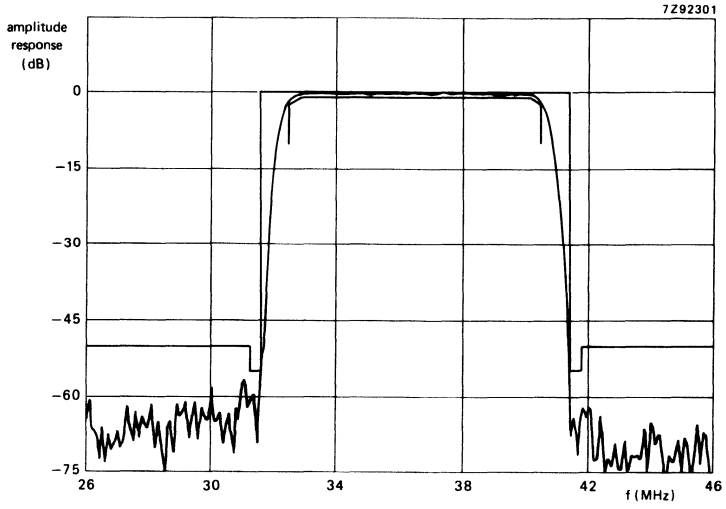


Fig. 3.

SURFACE ACOUSTIC WAVE FILTER

The RW662 is a surface acoustic wave filter for use in high performance system I TV modulators and transmitters with separate sound processing.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 33,7 to 39,8 MHz
Passband amplitude ripple (p-p)	typ. 0,4 dB
Passband group delay ripple (p-p)	typ. 50 ns
Insertion loss (50 Ω source and load)	typ. 26 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

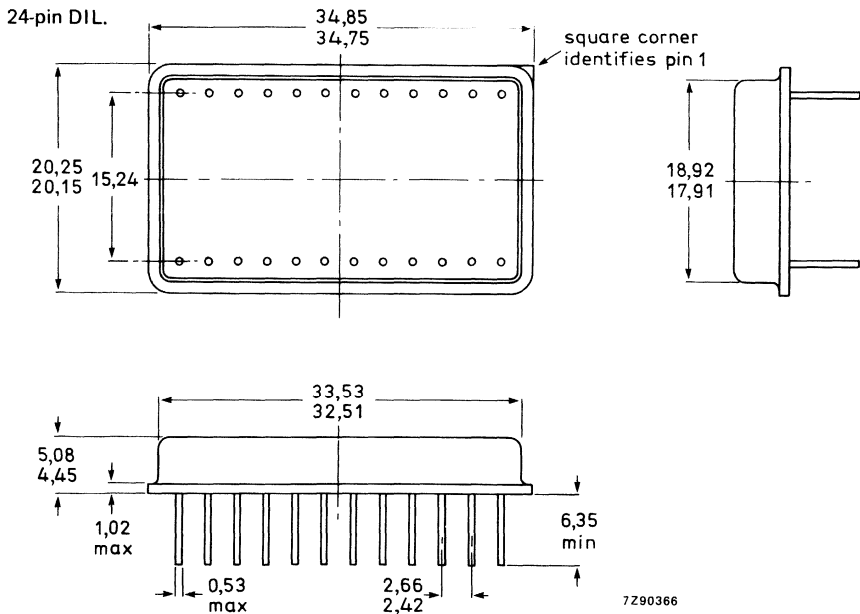


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to +70 °C
Storage temperature range	-25 to +85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 38,9 MHz at the design temperature would be measured at 39,0 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 39,0 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	typ. 33,8 to 39,5	
Passband amplitude ripple (p-p)		typ. 0,4; max. 1,0
Amplitude	33,0; 40,5	max. -40
Amplitude	40,0	min. -4
Stopband	d.c. to 32,5	min. 50
Stopband	41,0 to 100	min. 50

General

Insertion loss	typ. 26 dB; max. 27 dB
Passband group delay	typ. 3750 ns
Passband group delay ripple (p-p)	typ. 50 ns; max. 60 ns

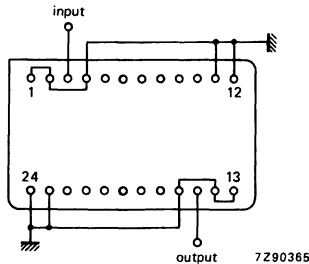


Fig. 2.

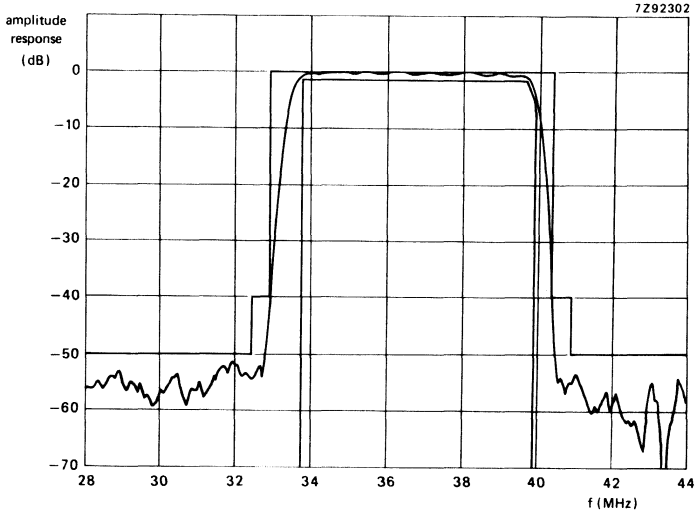


Fig. 3.

SURFACE ACOUSTIC WAVE FILTER

The RW663 is a surface acoustic wave filter for use in high performance system I TV modulators and transmitters. It is the sound-only channel complement to the RW662.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 32,8 to 33,2 MHz
Passband amplitude ripple (p-p)	typ. 1,0 dB
Passband group delay ripple (p-p)	max. 100 ns
Insertion loss (50 Ω source and load)	typ. 28 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

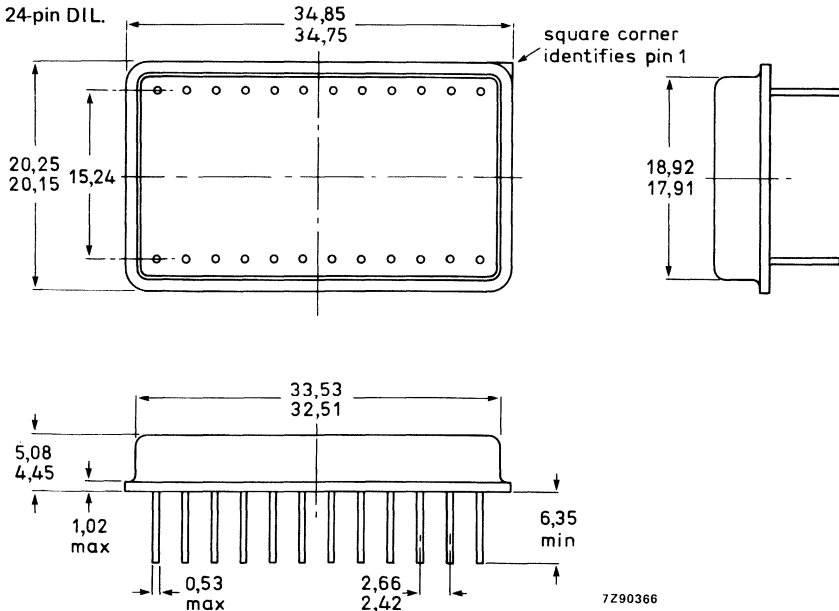


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to + 70 °C
Storage temperature range	-25 to + 85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, -75 to 10⁻⁶/K.

For example the response at 32,9 MHz at the design temperature would be measured at 33,0 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 33,0 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-1 dB)	typ. 32,8 to 33,2	
Passband amplitude ripple (p-p)		typ. 1,0; max. 2,0
Amplitude	32,2	max. -50
Amplitude	33,8	max. -45
Stopband	d.c. to 32,2	min. 50
Stopband	33,8 to 41,0	min. 45
Stopband	41,0 to 100	min. 50

General

Insertion loss	typ. 28 dB; max. 30 dB
Passband group delay	typ. 3800 ns
Passband group delay ripple (p-p)	max. 100 ns

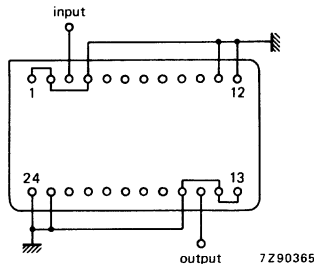


Fig. 2.

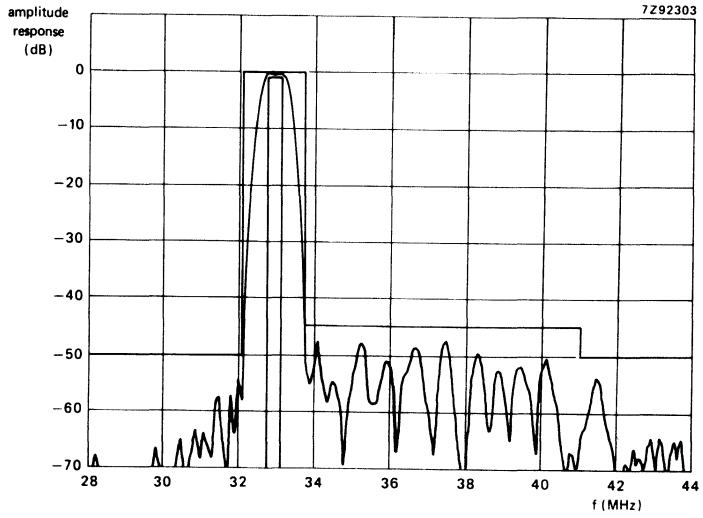


Fig. 3.

SURFACE ACOUSTIC WAVE FILTER

The RW664 is a surface acoustic wave filter for use in high performance system I TV modulators and transmitters with separate sound processing. It has low amplitude and group delay ripple.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 34,2 to 39,5 MHz
Passband amplitude ripple (p-p)	typ. 0,4 dB
Passband group delay ripple (p-p)	typ. 55 ns
Insertion loss (50 Ω source and load)	typ. 28 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

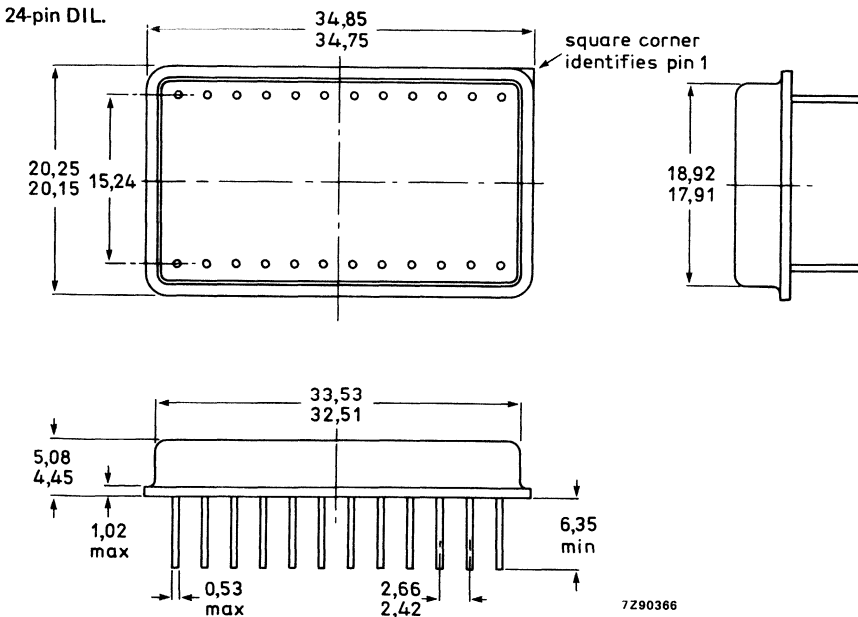


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to + 70 °C
Storage temperature range	-25 to + 85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 36,9 MHz at the design temperature would be measured at 37,0 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 37,0 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	typ. 34,3 to 39,1	
Passband amplitude ripple (p-p)		typ. 0,4; max. 1,0
Amplitude	33,0	max. -30
Amplitude	33,5	min. -4
Stopband	d.c. to 31,0	min. 56
Stopband	42,0 to 100	min. 56

General

Insertion loss	typ. 28 dB; max. 29 dB
Passband group delay	typ. 3500 ns
Passband group delay ripple (p-p)	typ. 55 ns; max. 65 ns

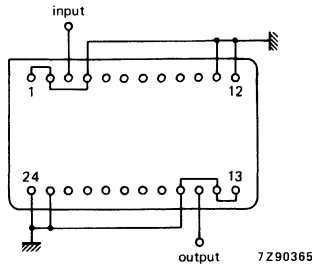


Fig. 2.

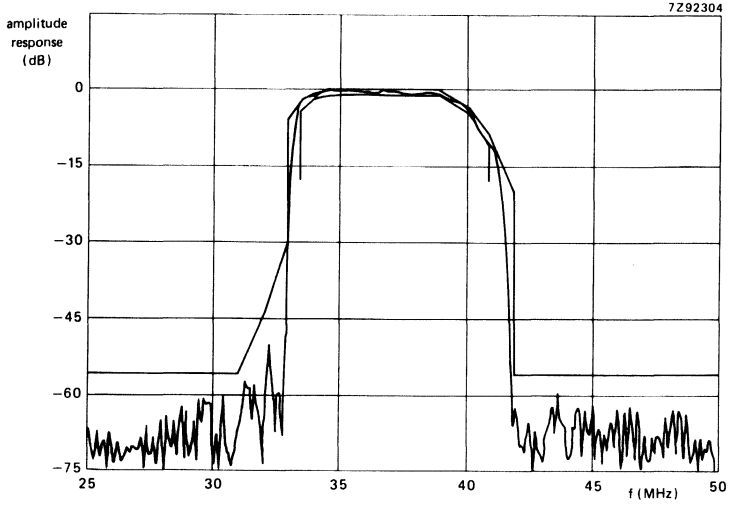


Fig. 3.

DEVELOPMENT SAMPLE DATA

This information is derived from development samples made available for evaluation. It does not necessarily imply that the device will go into regular production.

RW671

SURFACE ACOUSTIC WAVE FILTER

The RW671 is a surface acoustic wave i.f. bandpass filter for use in high performance system M TV transmitter applications.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 41,5 to 46,5 MHz
Passband amplitude ripple (p-p)	typ. 0,8 dB
Passband group delay ripple (p-p)	typ. 40 ns
Insertion loss (25 Ω source and load)	typ. 25 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

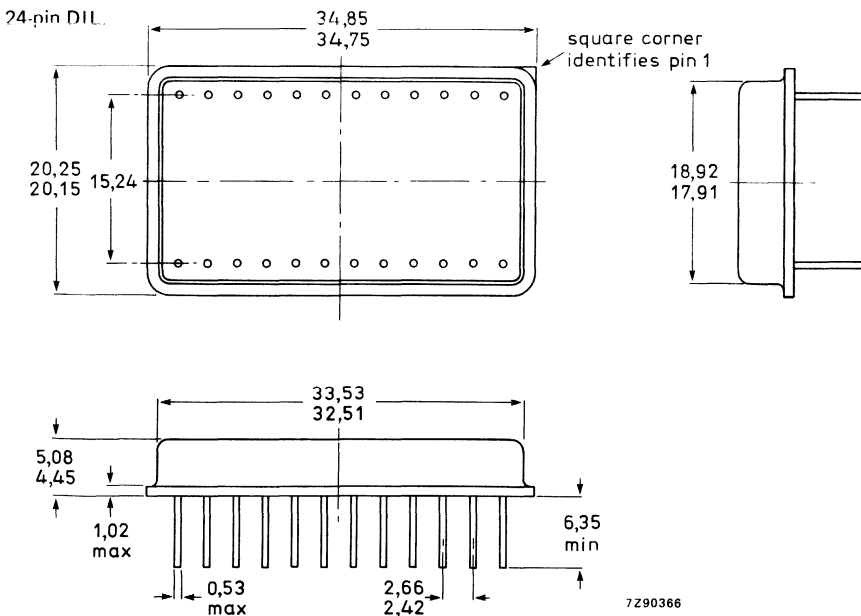


Fig. 1.

SURFACE ACOUSTIC WAVE FILTER

The RW672 is a surface acoustic wave filter for use in high performance system M TV modulators and transmitters with separate sound processing.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 35,0 to 39,5 MHz
Passband amplitude ripple (p-p)	typ. 0,4 dB
Passband group delay ripple (p-p)	typ. 70 ns
Insertion loss (50 Ω source and load)	typ. 22 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

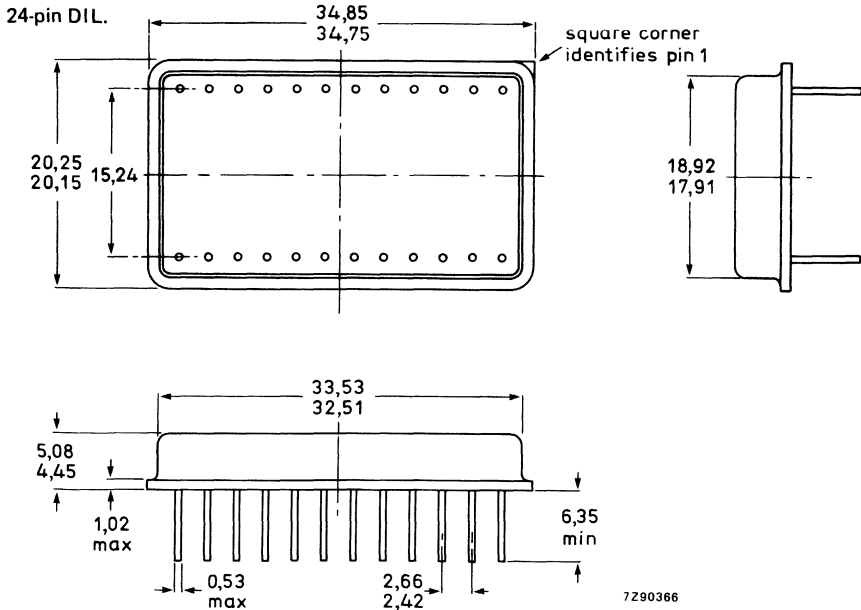


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to +70 °C
Storage temperature range	-25 to +85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 37,4 MHz at the design temperature would be measured at 37,5 MHz at 23 °C

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 37,5 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	typ. 35,2 to 39,4	
Passband amplitude ripple (p-p)		typ. 0,4; max. 1,0
Amplitude	34,15	max. -25
Amplitude	40,25	max. -20
Amplitude	40,5	max. -46
Stopband	d.c. to 33,0	min. 50
Stopband	42,5 to 100	min. 50

General

Insertion loss	typ. 22 dB; max. 23 dB
Passband group delay	typ. 3600 ns
Passband group delay ripple (p-p)	typ. 70 ns; max. 90 ns

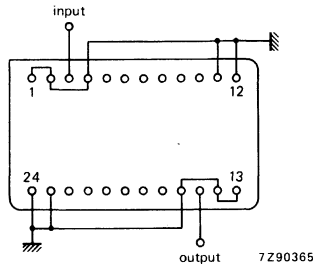


Fig. 2.

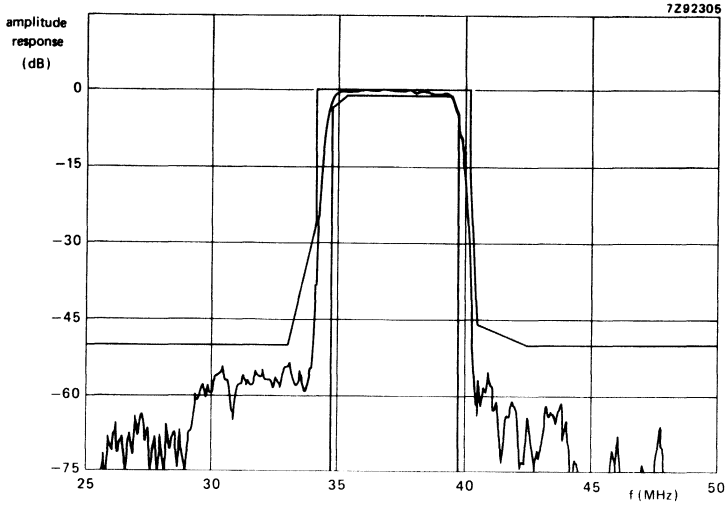


Fig. 3.

SURFACE ACOUSTIC WAVE FILTER

The RW681 is a surface acoustic wave filter for use in high performance system D/K TV modulators and transmitters with separate sound processing. It has a low amplitude and group delay ripple.

The filter is manufactured on a lithium niobate substrate and is encapsulated in a 24-pin hermetically sealed metal DIL package.

QUICK REFERENCE DATA

Passband (-1 dB)	typ. 33,2 to 39,6 MHz
Passband amplitude ripple (p-p)	typ. 0,4 dB
Passband group delay ripple (p-p)	typ. 40 ns
Insertion loss (50 Ω source and load)	typ. 27 dB
Stopband suppression	typ. 50 dB
Design operating temperature	65 \pm 5 $^{\circ}$ C
Operating temperature range	-10 to + 70 $^{\circ}$ C

MECHANICAL DATA

Dimensions in mm

24-pin DIL.

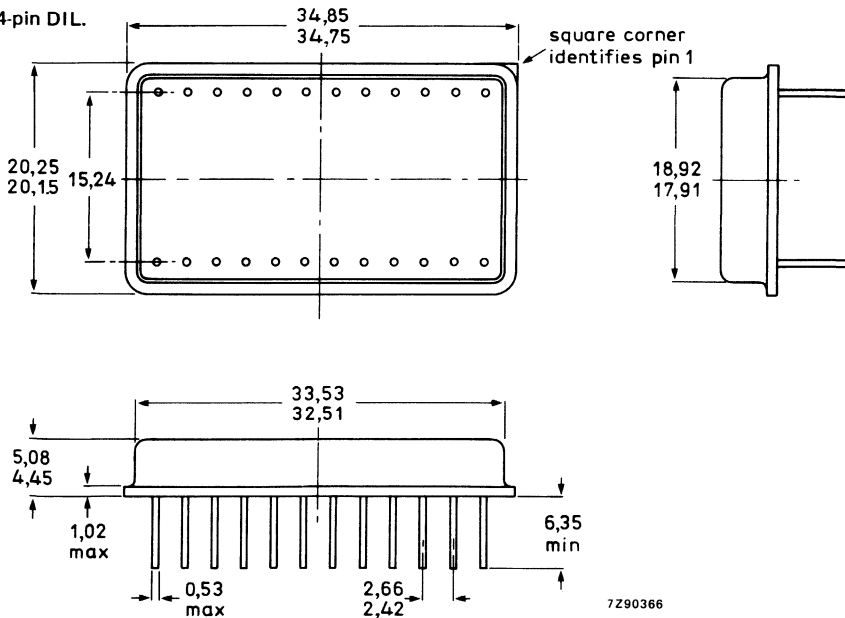


Fig. 1.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to + 70 °C
Storage temperature range	-25 to + 85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	23 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Performance at the design temperature of 65 °C may be obtained from the measured response at 23 °C using the temperature coefficient of frequency, $-75 \times 10^{-6}/K$.

For example the response at 37,4 MHz at the design temperature would be measured at 37,5 MHz at 23 °C.

Amplitude response (see also Fig. 3)

Performance figures below are relative to the level at 37,5 MHz, the reference frequency at 23 °C.

	frequency MHz	amplitude dB
Passband (-0,5 dB)	33,3 to 39,5	
Passband amplitude ripple (p-p)		typ. 0,4; max. 1,0
Amplitude	32,5	max. -25
Amplitude	40,25	max. -20
Amplitude	40,5	max. -46
Stopband	d.c. to 31,0	min. 50
Stopband	43,5 to 100	min. 50

General

Insertion loss	typ. 27 dB; max. 28 dB
Passband group delay	typ. 3600 ns
Passband group delay ripple (p-p)	typ. 40 ns; max. 50 ns

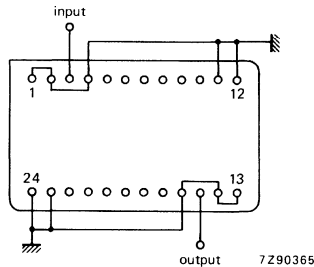


Fig. 2.

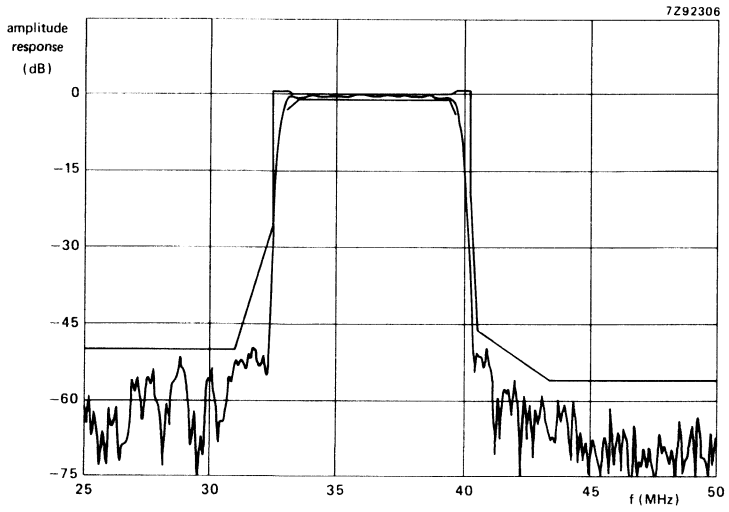


Fig. 3.

Telephony filters

SURFACE ACOUSTIC WAVE FILTER

The SWF324AA is a surface acoustic wave filter on ST quartz for use in digital telephony as a carrier recovery filter. This filter is specifically designed to provide satisfactory operation whether balanced or unbalanced input or output signals are required.

QUICK REFERENCE DATA

Nominal centre frequency	324,3 MHz
Bandwidth (-3 dB)	1,5 MHz
Insertion loss (50 Ω source and load)	21,5 dB
Operating ambient temperature range	-10 to + 70 °C

MECHANICAL DATA

Dimensions in mm

5 lead TO-8

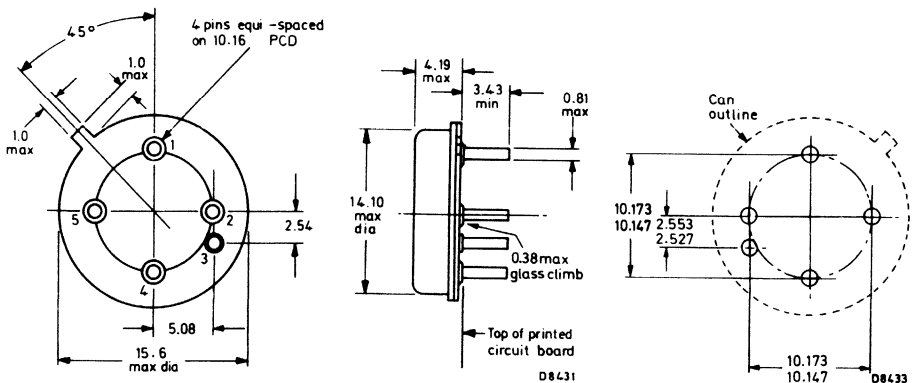


Fig. 1a Connections:

1 input	or	1 output
2 input		2 output
3 can (earth)		3 can (earth)
4 output		4 input
5 output		5 input

Fig. 1b Printed circuit board

hole layout
Standard 0,1" grid
Hole dia. 1,2 mm min.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature range	-10 to +70 °C
Storage temperature range	-25 to +85 °C
Pin to pin voltage (short term) max.	30 V

CHARACTERISTICS

Test conditions

Ambient temperature	25 °C
Input drive impedance	50 Ω
Load impedance (balanced)	50 Ω

Amplitude response (see also Fig. 2)

	min.	typ.	max.
Centre frequency, f_0	324,2	324,3	324,4 MHz
Bandwidth (-3 dB)	1,47	1,50	1,53 MHz
Insertion loss	21	21,5	22 dB
Amplitude ripple, $f_0 \pm 100$ kHz		≤0,05	dB
Stopband suppression, relative to peak, at $f_0 - 2,5$ MHz and $f_0 + 2,5$ MHz	25	27	dB
Stopband suppression, relative to peak, d.c. to 310 MHz		50	dB
335 to 500 MHz		40	dB
Absolute group delay		750	ns
Group delay ripple, $f_0 \pm 150$ kHz (peak-to-peak value)		10	ns
Group delay ripple, $f_0 \pm 1,5$ MHz (peak-to-peak value)		30	ns
Temperature coefficient		-3	$\times 10^{-6}/K$

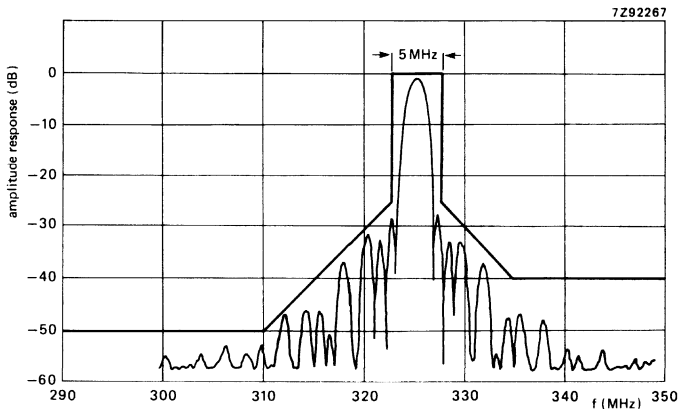


Fig. 2.

INDEX

type number	page
RW153A	7
RW154	11
RW173	15
RW173A	19
RW180	41
RW200	23
RW300	27
RW303	31
RW400	35
RW651	59
RW652	63
RW661	67
RW662	71
RW663	75
RW664	79
RW671	83
RW672	85
RW681	89
SWF 134-28, 30	49
SWF324AA	95

