



# TTE miniature FILTERS

THESE PAGES CATALOG OVER 1,000,000 STANDARD FILTER TYPES—  
SPECIFY ANY COMBINATION OF FREQUENCY,  
SOURCE AND LOAD OHMS WITHIN THE MIN-MAX RANGES.

MANY TYPES AVAILABLE FROM STOCK — REQUEST STOCK LIST

## BANDPASS FILTERS FOR ANY CENTER FREQUENCY FROM 30Hz (SPECIALS FROM 10Hz UPWARD)

Series	Fc Center Freq. Min.	Range Max.	Bandwidth @ -3db	Stopband Attenuation	Source, Ohms Min. Max.	Load, Ohms Min. Max.	Case No.
K10	500Hz	9.9KHz	±1%Fc	30db at .92Fc & 1.1Fc & 40db at .86Fc & 1.2Fc	1K	500K	4
K10A	10KHz	100MHz	±1%Fc		50	10K	3 or 11
K11B	500Hz	9.9KHz	±1%Fc	30db at .94Fc & 1.06Fc & 40db at .93Fc & 1.1Fc	1K	500K	4
K11E	10KHz	99KHz	±1%Fc		1K	10K	3 or 13
K11G	100KHz	100MHz	±1%Fc		50	1K	12
K12A	500Hz	9.9KHz	±2%Fc	30db at .92Fc & 1.1Fc	1K	10K	4
K12C	10KHz	100MHz	±2%Fc	30db at .92Fc & 1.1Fc	50	10K	3 or 12
K13A	30Hz	99Hz	±5%Fc	55db at .5Fc & 2Fc	1K	500K	5
K14A	100Hz	100KHz	±5%Fc	40db at .5Fc & 2Fc	500	10K	3
K14B	300Hz	999Hz	±5%Fc	35db at .5Fc & 2Fc	700	15K	11
K14E	1KHz	99KHz	±5%Fc	40db at .5Fc & 2Fc	1K	1K	10
K14D	100KHz	100MHz	±5%Fc	43db at .5Fc & 2Fc	50	100	10
K17	100Hz	10KHz	±5%Fc	60db at .5Fc & 2Fc	500	10K	4
K17D	300Hz	3KHz	±5%Fc	50db at .5Fc & 2Fc	500	15K	12
K17E	3KHz	99KHz	±5%Fc	50db at .5Fc & 2Fc	100	50K	11
K17C	100KHz	100MHz	±5%Fc	60db at .5Fc & 2Fc	50	300	11
K18	10KHz	100KHz	±5%Fc	60db at .5Fc & 2Fc	100	100K	3
K20	100Hz	3.9KHz	±7.5%Fc	40db at .57Fc & 1.75Fc	500	10K	4
K20C	250Hz	99KHz	±7.5%Fc	35db at .5Fc & 2Fc	1K	10K	11
K20D	100KHz	100MHz	±7.5%Fc	40db at .67Fc & 1.5Fc	50	300	11
K21B	1KHz	100KHz	±7.5%Fc	40db at .6Fc & 1.67Fc	500	10K	3
Q20	10KHz	99KHz	±7.5%Fc	40db at .7Fc & 1.4Fc	600	10K	4 or 13
Q21	10KHz	99KHz	±7.5%Fc	60db at .75Fc & 1.3Fc	600	10K	5 or 16
Q20A	100KHz	999KHz	±7.5%Fc	40db at .7Fc & 1.4Fc	50	1K	13
Q21A	100KHz	999KHz	±7.5%Fc	60db at .75Fc & 1.3Fc	50	1K	15
Q20B	1MHz	50MHz	±7.5%Fc	40db at .7Fc & 1.4Fc	50	75	12
Q21B	1MHz	50MHz	±7.5%Fc	60db at .75Fc & 1.3Fc	50	75	15
K30	100Hz	3.9KHz	±15%Fc	40db at .4Fc & 2.5Fc	500	10K	4
K30C	150Hz	99KHz	±15%Fc	25db at .45Fc & 2.2Fc	1K	10K	11
K30D	100KHz	100MHz	±15%Fc	40db at .5Fc & 2Fc	50	300	11
K31B	1KHz	100KHz	±15%Fc	40db at .45Fc & 2.2Fc	500	10K	3
Q30	10KHz	99KHz	±15%Fc	30db at .67Fc & 1.37Fc	600	10K	4 or 13
Q31	10KHz	99KHz	±15%Fc	50db at .73Fc & 1.31Fc	600	10K	5 or 16
Q30A	100KHz	999KHz	±15%Fc	30db at .67Fc & 1.37Fc	50	1K	13
Q31A	100KHz	999KHz	±15%Fc	50db at .73Fc & 1.31Fc	50	1K	15
Q30B	1MHz	50MHz	±15%Fc	30db at .67Fc & 1.37Fc	50	75	12
Q31B	1MHz	50MHz	±15%Fc	50db at .73Fc & 1.31Fc	50	75	15

The bandwidth for any of the above filters can be increased or decreased to specification.



**WIDE BAND FILTERS:** Bandwidths of ±16% or greater can be obtained by ordering TTE standard High pass and Low pass filter sections as a composite network. Select numbers from the Series H and J listings on the next page which give the desired attenuation slopes and combine these numbers. For example to obtain a slope of 40db at 0.65 of the lower frequency cut-off, Fc1, (High pass section) and 40db at 1.6 of the upper frequency cut-off, Fc2, (Low pass section) use H6959. **THE HIGH PASS SERIES NUMBER IS FIRST, FOLLOWED BY THE LOW PASS NUMBER.** Types with dissymmetrical attenuation slopes can be combined. Also specify the 3db down cut-off frequencies Fc1 and Fc2 and impedance. The price is the sum of the HP and LP section prices.



**INSERTION LOSSES** for bandpass types between equal terminations are from 0.5 to 6db depending upon bandwidth, frequency and size. K10 and K11 types have about 10db, and K12 types about 5db flat loss. **SPECIALS** are available for center frequencies from 10Hz upward and 60db to 3db bandwidth ratios as sharp as 2.0:1. **TO ORDER** Specials, also specify (5) bandwidth and (6) stop band attenuation required.

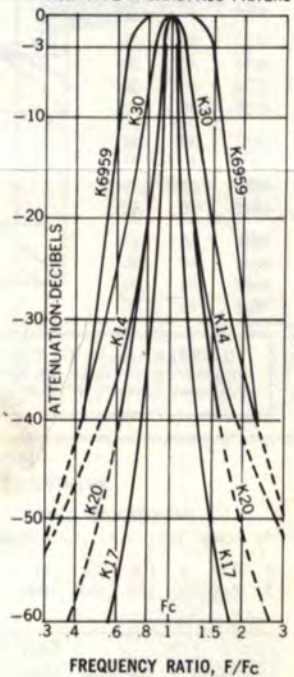
**TO ORDER BANDPASS FILTERS** — Specify (1) TTE Series No., (2) minus 3db frequencies, (3) source impedance, (4) load impedance. **PRICES** \$41 to \$166 each.

**TELEMETERING:** Any of the above Bandpass Filters can be supplied for standard IRIG channels.

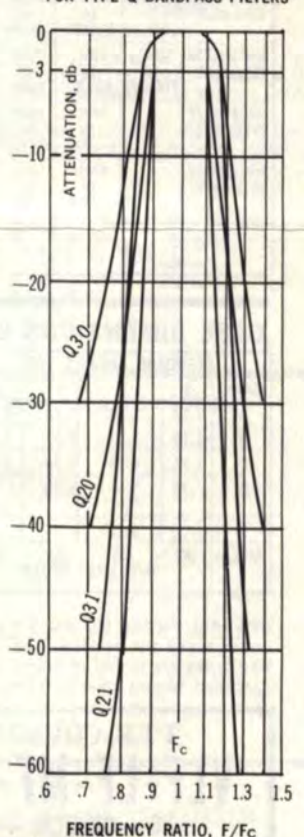
Lowpass Filters are also available for IRIG channels, see page 2.

**TO ORDER** specify IRIG channel number or letter, source and load impedance and case size.

TYPICAL RESPONSE CURVES FOR TYPE K BANDPASS FILTERS



TYPICAL RESPONSE CURVES FOR TYPE Q BANDPASS FILTERS



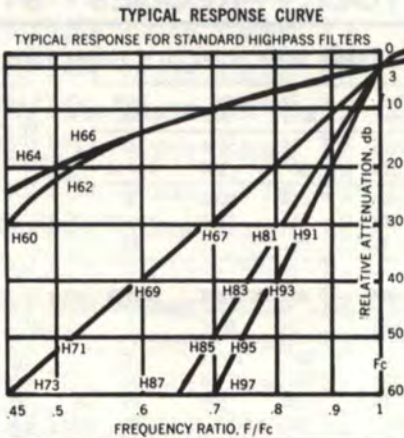
**TT ELECTRONICS INC.** 2214 SO. BARRY AVE. LOS ANGELES, CA 90064 (213) 478-8224

# TTE miniature FILTERS

## HIGH PASS

STANDARD FILTERS FOR ANY CUT-OFF FREQ. FROM 75Hz TO 100MHz

Series	Min. Attn. db	Cut-off Ratio F/F <sub>c</sub>
H60E	30	.45
H62E	40	.35
H64E	50	.25
H66E	60	.15
H67E	30	.70
H69E	40	.60
H71E	50	.52
H73E	60	.45
H81E	30	.81
H83E	40	.75
H85E	50	.70
H87E	60	.65
H91E	30	.85
H93E	40	.80
H95E	50	.75
H97E	60	.70

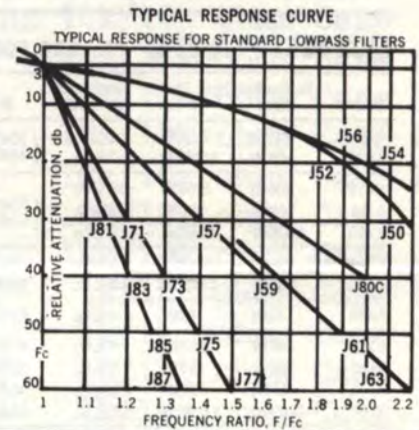


TO ORDER specify (1) TTE Series No., (2) minus 3db freq., (3) impedance. (4) Case No. SPECIALS are available for cut-off frequencies down to 40Hz and above 100MHz. PRICES \$30 to \$83.

## LOW PASS

STANDARD FILTERS FOR ANY CUT-OFF FREQ. FROM 75Hz TO 100MHz (\*And from 10Hz to 74Hz)

Series	Min. Attn. db	Cut-off Ratio F/F <sub>c</sub>
J50E	30	2.2
J52E	40	3.0
J54E	50	4.0
J56E	60	5.5
J57E	30	1.4
J59E	40	1.6
J61E	50	1.9
J63E	60	2.2
J71E	30	1.2
J73E	40	1.3
J75E	50	1.4
J77E	60	1.5
J81E	30	1.15
J83E	40	1.20
J85E	50	1.27
J87E	60	1.35
*J80E	40	2.0



TO ORDER specify (1) TTE Series No., (2) minus 3db freq., (3) impedance. (4) Case No. SPECIALS are available for cut-off frequencies down to 3Hz and above 100MHz. PRICES \$30 to \$83.

## IMPEDANCE GUIDE HIGHPASS AND LOWPASS TYPES

IMPEDANCE GUIDE — HIGH PASS AND LOW PASS TYPES		10Hz	50Hz	100Hz	500Hz	5KHz	10KHz	100KHz	500KHz	1MHz	5MHz	100MHz
Z MIN	Ω	10K	10K	5K	1K	500	100	50	50	50	50	50
Z MAX	Ω	15K	39K	39K	39K	20K	3K	3K	1K	300	75	

SOURCE AND LOAD impedances are equal and resistive for standard HP and LP filters. The insertion loss is less than 0.5db for ±10% matching. Typical passband flatness within ±0.2db. Phase linearity is reasonable. Some types are used for pulse transmission. SPECIALS for other impedances and unequal terminations are available. Units with cut-off ratios as sharp as 1.06 (0.94 Highpass) are available.

## CASE SIZES FOR HIGHPASS AND LOWPASS FILTERS

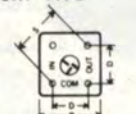
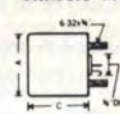
Series No.	STANDARD CHASSIS TYPE				FLAT PC BOARD TYPE							
	2	3	4	5	9	10	11	12	13	15	16	17
H60E-H66E J50E-J56E	500Hz to 100KHz	100Hz to 200KHz	75Hz to 100Hz		200Hz to 500Hz	500Hz to 100MHz						
H67E-H73E J57E-J63E	50KHz to 100KHz	1KHz to 50KHz	75Hz to 1KHz				2KHz to 100MHz	200Hz to 2KHz	100Hz to 200Hz			
H81E-H87E J71E-J77E		5KHz to 100KHz	1KHz to 5KHz	100Hz to 1KHz			2.5KHz to 100MHz	500Hz to 2.5KHz		200Hz to 500Hz	100Hz to 200Hz	
H91E-H97E J81E-J87E		5KHz to 100KHz	1KHz to 5KHz	100Hz to 1KHz				2.5KHz to 100MHz		500Hz to 2.5KHz	200Hz to 500Hz	
J80E				10Hz to 74Hz								



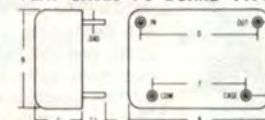
## CASE DIMENSIONS & MOUNTING INFORMATION FOR ALL FILTERS

Case	STANDARD CHASSIS TYPE				FLAT PC BOARD TYPE								Case
	2	3	4	5	9	10	11	12	13	15	16	17	
A	1.19	1.31	1.63	1.81	1.27	1.27	1.88	2.0	2.0	2.96	2.96	2.96	A
B	1.19	1.31	1.63	1.94	1.27	1.27	1.44	2.0	2.0	1.93	1.93	1.93	B
C	1.25	1.75	2.38	2.44	1.0	.5	.5	.5	.75	.5	.75	1.25	C
D	.75	—	1.19	1.38/1.25	.9	.9	1.5	1.5	1.5	2.4	2.4	2.4	D
S	—	1.25	—	—	.9	.9	1.0	1.5	1.5	1.4	1.4	1.4	S
Mtg.	(4)	(2)	(4)	(4)	.6	.6	1.0	1.0	1.0	2.0	2.0	2.0	T

### CHASSIS MOUNT TYPE



### FLAT CASES PC BOARD TYPE



FROM 500KHz UPWARD FLAT CASE "COM" IS CONNECTED TO CASE.

GENERAL FILTER NOTES: TTE Filters are epoxy encased within hermetically sealed steel cases. The case finish is copper plate per MIL-C 14550 under fused tin per MIL-T-10727A. The maximum power output without de-tuning is 10 to 20 milliwatts for most low frequency types. K10, K11 and K12 types are tested at 100mv and B83 types at .77v output for all impedance levels. Terminations are understood to be resistive unless otherwise specified. Mount clear of transformers or other strong magnetic fields. BNC and SMA connectors are available.

TTE COVERS THE RANGE —  
**VLF-LF-MF-HF-VHF-UHF**  
LC — CRYSTAL — POWER NETWORKS

# TT ELECTRONICS

INC. 2214 SO. BARRY AVE. / LOS ANGELES, CA 90064 / (213) 478-8224

# TTE miniature FILTERS

## VHF-UHF

### ANY FREQUENCY BANDPASS — FROM 100MHz TO 300MHz

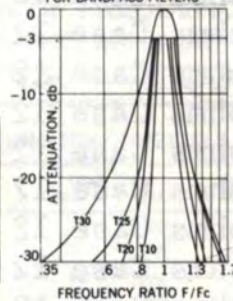
Series	F <sub>c</sub> Center Freq. Min.	Range Max.	Bandwidth @ 3db	Stopband Attenuation	Source & Load Ohms	Case No.
T10	100MHz	299MHz	±1%F <sub>c</sub>	30db at .8F <sub>c</sub> & 1.35F <sub>c</sub>	50	136
T14	100MHz	299MHz	±2%F <sub>c</sub>	30db at .79F <sub>c</sub> & 1.36F <sub>c</sub>	50	136
T20	100MHz	300MHz	±5%F <sub>c</sub>	30db at .71F <sub>c</sub> & 1.47F <sub>c</sub>	50	133
T25	100MHz	300MHz	±7.5%F <sub>c</sub>	30db at .45F <sub>c</sub> & 1.62F <sub>c</sub>	50	133
T30	100MHz	300MHz	±10%F <sub>c</sub>	30db at .35F <sub>c</sub> & 1.65F <sub>c</sub>	50	133

### ANY FREQUENCY LOWPASS — FROM 10MHz TO 300MHz

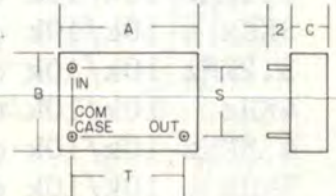
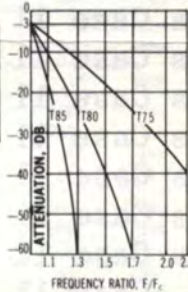
Series	Attenuation, db	Cut-off Ratio	Source & Load Ohms	Case No.
T75	40	2.2	50	133
T80	60	1.7	50	142
T85	60	1.3	50	144

**TO ORDER BANDPASS** Specify (1) TTE Series Number, (2) Center Frequency, (3) Minus 3db frequencies. The approximate price is \$65. Other Bandwidths may be specified.  
**TO ORDER LOWPASS** Specify (1) TTE Series Number, (2) Cutoff frequency. PRICES \$49 to \$114.

TYPICAL RESPONSE CURVES FOR BANDPASS FILTERS



TYPICAL RESPONSE FOR STANDARD LOWPASS FILTERS



Case	A	B	C	S	T
133	1.16	.66	.38	.38	.8
136	1.6	1.0	.5	.65	1.3
142	2.2	.74	.38	.44	1.9
144	3.0	.75	.38	.44	2.7

## SUBMINIATURE

### BANDPASS FILTERS FOR ANY FREQUENCY FROM 300Hz TO 100MHz

Series	F <sub>c</sub> Center Freq. Range		Bandwidth @ -3db Max.	Stopband Attenuation	Source Ohms		Load Ohms		Case No.
	Min.	Max.			Min.	Max.	Min.	Max.	
S10A	300Hz	1KHz	±7.5%F <sub>c</sub>	35db at .55F <sub>c</sub> & 1.8F <sub>c</sub>	10k	10k	10k	10k	31
S11	1KHz	5KHz	±7.5%F <sub>c</sub>	40db at .55F <sub>c</sub> & 1.8F <sub>c</sub>	1k	10k	1k	10k	31
S12	5KHz	50KHz	±7.5%F <sub>c</sub>	40db at .68F <sub>c</sub> & 1.75F <sub>c</sub>	1k	1k	1k	1k	30 or 31
S13B	50KHz	999KHz	±7.5%F <sub>c</sub>	40db at .58F <sub>c</sub> & 1.75F <sub>c</sub>	500	1k	500	1k	30 or 31
S14B	1MHz	100MHz	±7.5%F <sub>c</sub>	40db at .58F <sub>c</sub> & 1.75F <sub>c</sub>	50	500	50	500	31
S20	300Hz	1KHz	±15%F <sub>c</sub>	40db at .4F <sub>c</sub> & 2.5F <sub>c</sub>	10k	10k	10k	10k	31
S21	1KHz	5KHz	±15%F <sub>c</sub>	40db at .4F <sub>c</sub> & 2.5F <sub>c</sub>	1k	10k	1k	10k	31
S22A	5KHz	50KHz	±15%F <sub>c</sub>	40db at .4F <sub>c</sub> & 2.5F <sub>c</sub>	1k	10k	1k	10k	30 or 31
S23B	50KHz	999KHz	±15%F <sub>c</sub>	40db at .4F <sub>c</sub> & 2.5F <sub>c</sub>	500	1k	500	1k	30 or 31
S24A	1MHz	100MHz	±15%F <sub>c</sub>	40db at .4F <sub>c</sub> & 2.5F <sub>c</sub>	50	500	50	500	31



**TO ORDER BANDPASS** specify (1) TTE series number, (2) center frequency, (3) source and load impedance. The approximate price is \$80 each.  
**TO ORDER HP and LP** specify (1) TTE series number, (2) cut-off frequency, (3) source and load impedance. The approximate price is \$73 each.

**IMPEDANCE GUIDE:** standard impedances for HP and LP types are 10K (1KHz to 5KHz) 1K to 10K (5KHz to 10KHz) 300 ohms to 1K (10KHz to 100KHz) 50 ohms to 1K (100KHz to 500KHz) 50 ohms to 300 ohms (0.5MHz to 1MHz) 50 to 75 ohms (1MHz to 10MHz) 50 ohms (from 10MHz to 100MHz).

**CASE GUIDE:** the standard case for HP and LP types is case 29 (1KHz to 5KHz) case 29 or 30 (5KHz to 10KHz) case 30 (10KHz to 1MHz) and case 31 (1MHz to 100MHz).

#### LOWPASS

FROM 1KHz to 100MHz

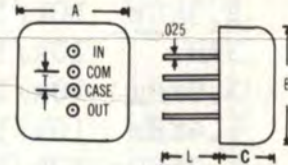
#### HIGHPASS

FROM 1KHz to 100MHz

Series	Min. Attn. db	Cut-off Ratio F/FC
S60	30	1.41
S61	40	1.67
S62	50	1.96
S63	60	2.45

Series	Min. Attn. db	Cut-off Ratio F/FC
S40	30	.7
S41	40	.59
S42	50	.51
S43	60	.4

Case	A	B	C	T	L
29	.75	.75	.75	.1	1.0
30	.75	.75	.5	.1	1.0
31	1.19	1.19	.5	.2	1.0

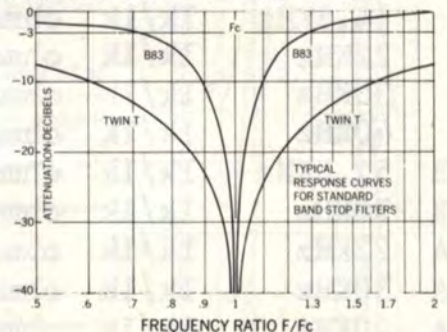


## BAND REJECT

### STANDARD FILTERS FOR ANY CENTER FREQUENCY FROM 10Hz TO 10MHz

Series	F <sub>c</sub> Center Freq. Range		Bandwidth -3db	Attenuation	Impedance		Circuit	Case No.
	Min.	Max.			Min.	Ohms Max.		
B83	10Hz	1MHz	.77F <sub>c</sub> & 1.3F <sub>c</sub>	50db Notch	50	1 Meg.	L-C	4
D	10Hz	100KHz	.25F <sub>c</sub> & 4 F <sub>c</sub>	50db Notch	SEE ORDERING INSTRUCTIONS BELOW		Twin-T	2
F	10Hz	100KHz	.25F <sub>c</sub> & 4 F <sub>c</sub>	60db Notch			Twin-T	2
R20	100Hz	3999Hz	$\left\{ \begin{array}{l} BW_{3db}/BW_{40db} \leq 5 \\ \text{For } BW_{40db} \geq 10\% F_c \end{array} \right.$	10K	50K	L-C	L-C	4 or 13
R30	4KHz	10MHz						50

**TO ORDER BAND REJECT FILTERS** — Specify (1) TTE Series No. or Letter, (2) center frequency, (3) source impedance, (4) load impedance. For Series R20 and R30 specify 40db bandwidth. Twin-T prices and cases apply to all filters using capacitor values from 0.1 MFD to 500 pF. C = 1/8.85FHz (R<sub>source</sub>R<sub>load</sub>)<sup>1/2</sup>. C is in farads. Filters with null frequencies as low as 1Hz are available. Terminations are regarded as resistive unless otherwise specified. PRICES \$19 to \$74.



# TT ELECTRONICS

INC. 2214 SO. BARRY AVE. / LOS ANGELES, CA 90064 / (213) 478-8224

## STOCK LIST

### BANDPASS (for details, see page 1)

K17D	300 Hz	10k/10k ohms	Case 12
K17D	400 Hz	10k/10k ohms	Case 12
K17D	500 Hz	10k/10k ohms	Case 12
K17D	600 Hz	10k/10k ohms	Case 12
K17D	800 Hz	10k/10k ohms	Case 12
K17D	1KHz	10k/10k ohms	Case 12
K17D	1.2KHz	10k/10k ohms	Case 12
K17D	1.5KHz	10k/10k ohms	Case 12
K17D	1.6KHz	10k/10k ohms	Case 12
K17D	2KHz	10k/10k ohms	Case 12
K17D	2.5KHz	10k/10k ohms	Case 12
K17D	3KHz	10k/10k ohms	Case 12
K17E	3.2KHz	10k/10k ohms	Case 11
K17E	4KHz	10k/10k ohms	Case 11
K17E	4.8KHz	10k/10k ohms	Case 11
K17E	5KHz	10k/10k ohms	Case 11
K17E	6KHz	10k/10k ohms	Case 11
K17E	8KHz	10k/10k ohms	Case 11
K17E	10KHz	10k/10k ohms	Case 11
K17E	20KHz	1k/1k ohms	Case 11
K17E	100KHz	1k/1k ohms	Case 11
K17C	10.7MHz	50/50 ohms	Case 11

### LOWPASS

J77E	75 Hz	10k/10k ohms	Case 5
J77E	100 Hz	10k/10k ohms	Case 5
J77E	120 Hz	10k/10k ohms	Case 5
J77E	200 Hz	10k/10k ohms	Case 16
J77E	300 Hz	10k/10k ohms	Case 16
J77E	1KHz	10k/10k ohms	Case 12
J77E	1.5KHz	10k/10k ohms	Case 12
J77E	2KHz	10k/10k ohms	Case 12
J77E	3KHz	10k/10k ohms	Case 11
J77E	4KHz	10k/10k ohms	Case 11
J77E	5KHz	10k/10k ohms	Case 11
J77E	8KHz	10k/10k ohms	Case 11
J77E	10KHz	10k/10k ohms	Case 11
J77E	15KHz	1k/1k ohms	Case 11
J77E	18KHz	1k/1k ohms	Case 11
J77E	20KHz	1k/1k ohms	Case 11
J77E	30KHz	1k/1k ohms	Case 11
J77E	100KHz	1k/1k ohms	Case 11
J77E	3MHz	50/50 ohms	Case 11
J77E	5MHz	50/50 ohms	Case 11
J77E	7MHz	50/50 ohms	Case 11

(For details, see page 2)

### BANDPASS, SUBMINATURE IRIG

S10	400 Hz	10k/10k ohms	Case 31
S10	560 Hz	10k/10k ohms	Case 31
S10	730 Hz	10k/10k ohms	Case 31
S10	960 Hz	10k/10k ohms	Case 31
S11	1.3KHz	10k/10k ohms	Case 31
S11	1.7KHz	10k/10k ohms	Case 31
S11	2.3KHz	10k/10k ohms	Case 31
S11	3KHz	10k/10k ohms	Case 31
S11	3.9KHz	10k/10k ohms	Case 31
S12	5.4KHz	10k/10k ohms	Case 31
S12	7.35KHz	10k/10k ohms	Case 30
S12	10.5KHz	10k/10k ohms	Case 30
S12	14.5KHz	1k/1k ohms	Case 30
S12	22KHz	1k/1k ohms	Case 30
S12	30KHz	1k/1k ohms	Case 30
S12	40KHz	1k/1k ohms	Case 30
S13B	52.5KHz	1k/1k ohms	Case 30
S13B	70KHz	1k/1k ohms	Case 30
S22A	22KHz	1k/1k ohms	Case 30
S22A	30KHz	1k/1k ohms	Case 30
S22A	40KHz	1k/1k ohms	Case 30
S23B	52.5KHz	1k/1k ohms	Case 30
S23B	70KHz	1k/1k ohms	Case 30

### BAND REJECT

B83 25Hz 600/600 ohms Case 4  
 B83 60Hz 600/600 ohms Case 4  
 B83 60Hz 10k/10k ohms Case 4

(For details see page 3)

Stock delivery can be made on the above types in small quantities. These are standard filters as described in the preceding general catalog. For other frequencies and impedances, please refer to the preceding pages.

To order stock filters specify the complete description. This filter supply is intended for urgent needs, therefore, the quantity is limited.

# TT ELECTRONICS INC.

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(For details, see page 3)