

# ADVANCED SYSTEM DESIGN PRODUCT SPECIFICATIONS

## FFT\*-\*P Taps

## Full Feature Equalizable



### FEATURES OF FFT\*-\*P TAP SERIES:

- ❑ ABILITY TO ACCEPT PLUG-IN MODULES FOR IMPROVED RETURN PATH PERFORMANCE:
  - ❑ CABLE EQUALIZATION
  - ❑ RETURN PATH ATTENUATION
  - ❑ CABLE SIMULATION
- ❑ AUTO-SEIZE F-CONNECTORS
- ❑ 5 MHz to 1 GHz BANDWIDTH
- ❑ MINIMAL INSERTION LOSS
- ❑ BACKWARD COMPATIBLE TO "F" SERIES
- ❑ SURGE RESILIENT
- ❑ SUPERIOR HUM MODULATION PERFORMANCE
- ❑ 12 AMP CONTINUOUS POWER PASSING
- ❑ RF/AC BYPASS CAPABILITY STANDARD
- ❑ UPGRADABLE TO POWER EXTRACTING

### PRODUCTS AVAILABLE:

- ❑ FFT2-\*P: 10 VALUES 4-29
- ❑ FFT4-\*P: 8 VALUES 7-29
- ❑ FFT8-\*P: 7 VALUES 10-29

### INTRODUCTION

The FFT\*-\*P series taps maintains Motorola's commitment to provide the latest technology while maintaining backward compatibility and allowing future upgradability. The FFT\*-\*P series taps have been designed to offer improved return path performance for today's advanced two-way HFC systems. These taps are capable of accepting a variety of plug-in, field configurable modules that allow greater flexibility in system design. These modules include cable equalizers, return path attenuators, and cable simulators for achieving the desired return path

system performance. For any of the plug-in module options available, the feederline signal remains unaffected due to the location of the plug-in within the circuitry (refer to the block diagram below). Only the drop signals are affected by the plug-in. The drop signals are all affected in the same manner by the selected plug-in module. These taps are shipped with a standard jumper (T-JP) installed which allows the FFT\*-\*P tap to achieve the same performance as Motorola's standard FFT\*-\*N series of taps. All mechanical specifications of the standard FFT\*-\*N taps are also maintained with the FFT\*-\*P series tap.

### CABLE EQUALIZER MODULE

The cable equalizer (T-EQ-\*) plug-in module attenuates the return path signal originating from the customer premise in an effort to reduce the effects of system ingress. The cable equalizer also tightens the window of return path signal variation to allow more efficient operation of return transmitters in optical nodes. The module is field configurable via removal of the tap faceplate in order to allow operators to maximize the return path performance.

### RETURN PATH ATTENUATOR MODULE

The return path attenuator (T-RPA/S-\*) plug-in module provides the same benefits as the cable equalizer module, but accomplishes this via a duplex filter. As a result, the T-RPA/S-\* is system split dependent and provides less impact to the forward drop signal than the cable equalizer. The high pass filter (T-HP/S-52) operates in the same manner as the T-RPA/S-\* module, but attenuates the return path even greater. This is useful in ingress problem areas where customers are presently not using return path services.

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### CABLE SIMULATOR MODULE

The cable simulator (T-CS-\*) plug-in module for the FFT\*-\*P tap provides additional benefits for use in systems containing Motorola's high output level RF amplifiers and optical nodes. The cable simulator plug-in maintains low loss in the return drop path, while attenuating the forward drop signals to the proper system design levels.

### AUTO-SEIZE F CONNECTOR

The auto-seize F-connector is designed to improve system reliability by increasing the clamping force over standard F-connectors. This aids in the prevention of oxides by providing a gas tight seal. This new design encompasses a greater surface/contact area than the industry standard 2-point contact F-connector and improves contact resistance. The F-connector also has minimal insertion force that lessens the opportunity to scratch the plating of the contact. Please reference the diagram below.

### ADVANCED F-PORT WEATHER SEALING

All P-Series taps have the added feature of advanced F-port weather sealing. Conventional taps require physical termination of the F-port to ensure a 100% moisture seal; this includes "epoxy sealed" taps. The Motorola P-series tap does not require any physical termination to ensure a 100% F-port weather seal. However, Motorola does continue to recommend the use of 75-Ohm terminations on all unused ports for optimal RF performance.

### BACKWARD COMPATIBILITY

All Motorola FFT\*-\*P series taps are backward compatible with Jerrold/General Instrument FFT-"F", "G", "H", "J", "K", and standard "N" series tap housings. These housings all are capable of a 5-1000 MHz bandwidth.

### SURGE RESILIENT

All FFT\*-\*P series taps offer surge resiliency at each F-port. This feature greatly reduces failures due to surges down the drop cable. This feature also eliminates hum problems associated with system grounding.

### 12 AMP POWER PASSING

The FFT\*-\*P series tap is capable of passing a maximum of 12 amperes continuous from input to output on the feeder. These taps are designed for optimal hum modulation performance at high currents and can be used in both 60 and 90 volt systems.

### RF/AC BYPASS CAPABILITY

The FFT\*-\*P series tap offers the feature of feeder-line continuity when the faceplate is removed. This is achieved through the use of a make-before-break switch that is contained in the tap housing. This feature allows the tap to be upgraded or replaced without interrupting service on the feeder.

For customers who own existing FFT taps without this feature, an external RF/AC bypass jumper (BTT-RF/AC) is available to perform this function for aerial installations. The jumper is installed only when the faceplate is being changed. The jumper is then removed and can be used again. A flexible version of the RF/AC bypass jumper (BTT-RF/AC/FLX) is also available for pedestal applications.

### UPGRADABLE TO POWER EXTRACTING

All FFT\*-\*P taps are upgradable to power extracting, as required. Motorola P-series power extracting tap upgrades can be installed in all FFT\*-\*P series taps housings and maintain the same backward compatibility as these taps. Power extracting taps are used for network powering of telephony equipment.

### DESIGN FLEXIBILITY

The FFT\*-\*P series of taps offers 25 different models to accommodate system design needs and lower construction costs. The FFT\*-\*P tap features a swivel center conductor seizure mechanism allowing for aerial or pedestal installations. This eliminates the need to remove the seizure screws, while a detent in the swivel mechanism provides for proper alignment for either installation mode. The modular design of the FFT\*-\*P provides interchangeability of tap assembly bottom plates without removing the housing from the cable. The housing is common for 2-, 4-, and 8-way taps.

### MECHANICAL SPECIFICATIONS

Hostile weather conditions are addressed by surface chromate conversion over a die-cast housing and faceplate made of 360-aluminum alloy. A weather seal

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gasket of molded neoprene prevents moisture and dust from entering the unit and a separate RF gasket ensures FCC interference specification compliance. An umbrella type cover design shields internal components by preventing the buildup of rainwater. Unique, waterproof self-sealing “F” ports prevent breathing through the ports, even if the house drop is disconnected. All threads of the four captive stainless

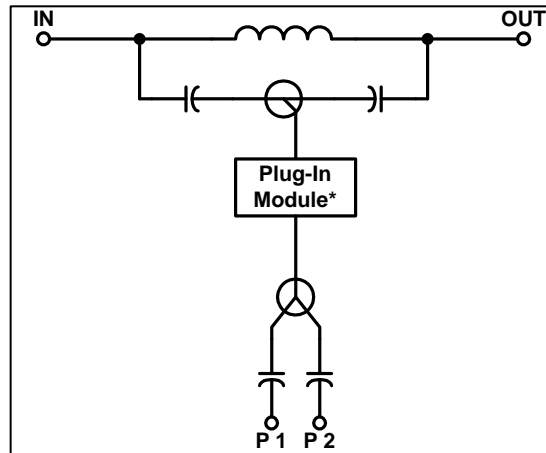
steel bolts are coated with water-repellent, anti-seizure lubricant to prevent the bolts from seizing to the base plate. In addition, the nickel-plated brass SCTE compliant ports offer increased strength and protection against corrosion in severe environmental conditions. The port lengths are one-half inch to accommodate locking terminators.

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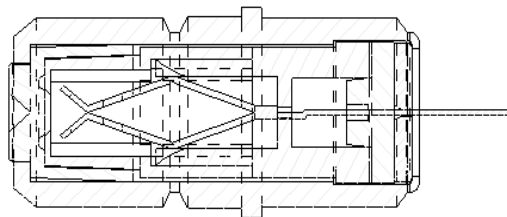
FFT\*-\*P Tap Block Diagram



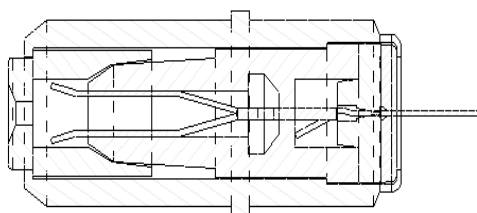
*\*Plug-In Module may be T-JP, T-EQ-\*, T-RPA/S-\*, T-HP/S-52, or T-CS-\*. Block Diagram shown is for a 2-port tap. The 4-port and 8-port taps will have additional splitters after the plug-in module.*

### P-Series F-Connector

#### Conventional F-Connector Design



#### Auto-Seize P-Series F-Connector Design



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FFT\*-\*P Series

Tap Design Specifications

Specifications: 5-1000 MHz

### INSERTION LOSS (dB) Typical Performance with Jumper (T-JP) Installed\*

Loss (dB)	Nom. Tap Value	5 MHz	10 MHz	50 MHz	450 MHz	550 MHz	750 MHz	870 MHz	1000 MHz
FF12-4TP	4.3	-	-	-	-	-	-	-	-
FF12-7P	7.5	3.4	3.3	3.3	3.9	4.2	4.3	4.5	4.7
FF12-10P	10.5	1.7	1.3	1.3	1.8	1.8	2.2	2.5	3.2
FF12-12P	12.0	1.4	1.1	1.0	1.5	1.6	1.9	2.4	2.7
FF12-14P	14.0	1.1	0.9	0.9	1.3	1.3	1.6	1.9	2.2
FF12-17P	17.0	1.0	0.9	0.8	1.2	1.2	1.5	1.7	2.0
FF12-20P	20.0	0.6	0.5	0.5	0.9	1.1	1.3	1.6	1.9
FF12-23P	23.0	0.3	0.3	0.3	0.8	0.9	1.3	1.4	1.8
FF12-26P	26.0	0.3	0.3	0.3	0.9	0.9	1.3	1.4	1.8
FF12-29P	29.0	0.3	0.3	0.3	0.8	0.9	1.3	1.4	1.8
FF14-7TP	6.8	-	-	-	-	-	-	-	-
FF14-10P	10.3	3.3	3.3	3.3	4.0	4.1	4.3	4.5	4.2
FF14-14P	14.4	1.6	1.3	1.3	1.9	1.9	2.4	2.6	3.2
FF14-15.5P	15.5	1.3	1.1	1.0	1.5	1.5	1.9	2.3	2.9
FF14-17P	17.0	1.1	0.9	1.0	1.4	1.3	1.7	2.1	2.6
FF14-20P	20.0	0.8	0.7	0.8	1.4	1.2	1.6	1.8	2.1
FF14-23P	23.0	0.5	0.5	0.5	1.0	1.0	1.2	1.6	1.9
FF14-26P	26.0	0.3	0.3	0.3	0.8	0.9	1.3	1.4	1.9
FF14-29P	29.0	0.3	0.3	0.3	0.9	0.9	1.3	1.4	1.9
FF18-10TP	10.4	-	-	-	-	-	-	-	-
FF18-14P	14.2	3.9	3.4	3.3	3.9	4.0	4.4	4.6	5.0
FF18-17P	17.8	1.8	1.8	1.6	2.1	2.3	2.7	2.8	3.5
FF18-20P	20.0	1.2	1.0	0.8	1.3	1.5	1.9	2.1	2.6
FF18-23P	22.5	1.0	0.9	0.8	1.2	1.2	1.5	1.7	2.1
FF18-26P	26.1	0.6	0.5	0.4	0.8	1.0	1.2	1.5	2.0
FF18-29P	29.2	0.3	0.3	0.3	0.7	0.9	1.2	1.4	1.9

The FFT\*-\*P is shipped standard with a jumper (T-JP) installed into the plug-in module sockets.  
Specifications are subject to change without notice.

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FFT\*-\*P Series

Tap Design Specifications

Specifications: 5-1000 MHz

### INSERTION LOSS (dB) Maximum Performance with Jumper (T-JP) Installed\*

Insertion Loss (dB)	MAXIMUM SPECIFICATION								
	Nom. Tap Value	5 MHz	10 MHz	50 MHz	450 MHz	550 MHz	750 MHz	870 MHz	1000 MHz
FFI2-4TP	4.3	-	-	-	-	-	-	-	-
FFI2-7P	7.5	3.6	3.5	3.5	4.1	4.4	4.5	4.7	5.0
FFI2-10P	10.5	2.0	1.5	1.5	2.0	2.0	2.4	2.7	3.5
FFI2-12P	12.0	1.6	1.3	1.2	1.7	1.8	2.1	2.6	2.9
FFI2-14P	14.0	1.4	1.1	1.1	1.5	1.5	1.8	2.1	2.9
FFI2-17P	17.0	1.2	1.1	1.0	1.3	1.4	1.7	2.0	2.2
FFI2-20P	20.0	0.9	0.7	0.7	1.1	1.3	1.5	1.8	2.1
FFI2-23P	23.0	0.6	0.5	0.5	1.0	1.1	1.4	1.6	2.0
FFI2-26P	26.0	0.6	0.5	0.5	1.0	1.1	1.4	1.6	2.0
FFI2-29P	29.0	0.6	0.5	0.5	1.0	1.1	1.4	1.6	2.0
FFI4-7TP	6.8	-	-	-	-	-	-	-	-
FFI4-10P	10.3	3.6	3.5	3.5	4.2	4.3	4.5	4.7	4.5
FFI4-14P	14.4	1.9	1.5	1.5	2.1	2.1	2.6	2.8	3.5
FFI4-15.5P	15.5	1.6	1.3	1.2	1.7	1.7	2.1	2.5	3.1
FFI4-17P	17.0	1.4	1.1	1.2	1.6	1.5	1.9	2.3	2.8
FFI4-20P	20.0	1.1	0.9	1.0	1.5	1.4	1.8	2.0	2.4
FFI4-23P	23.0	0.8	0.7	0.7	1.2	1.2	1.4	1.8	2.2
FFI4-26P	26.0	0.6	0.5	0.5	1.0	1.1	1.4	1.6	2.1
FFI4-29P	29.0	0.6	0.5	0.5	1.0	1.1	1.4	1.6	2.1
FFIB-10TP	10.4	-	-	-	-	-	-	-	-
FFIB-14P	14.2	4.2	3.6	3.5	4.1	4.2	4.6	4.8	5.3
FFIB-17P	17.8	2.1	2.0	1.8	2.3	2.5	2.9	3.0	3.8
FFIB-20P	20.0	1.3	1.2	1.0	1.5	1.7	2.1	2.3	2.9
FFIB-23P	22.5	1.3	1.1	1.0	1.4	1.4	1.7	1.9	2.4
FFIB-26P	26.1	0.9	0.7	0.6	0.9	1.1	1.4	1.7	2.2
FFIB-29P	29.2	0.6	0.5	0.5	0.9	1.1	1.4	1.6	2.2

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## FFT\*-\*P Taps

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FFT\*-\*P Series

Cable Equalizer Plug-In Module

Specifications: 5-1000 MHz

Specification	Frequency(MHz)	T-EQ-2	T-EQ-4	T-EQ-6	T-EQ-8	T-EQ-10	T-EQ-12	T-EQ-14	T-EQ-16
EQ Value (dB nominal)	870	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0
Insertion Loss (dB max)	5	3.1	4.3	6.2	7.5	9.4	11.0	12.9	14.4
	1000	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0
Drop Insertion Loss* (dB nominal)	5	2.9	4.1	6.0	7.3	9.2	10.8	12.6	14.1
	10	2.9	4.1	6.0	7.3	9.2	10.8	12.6	14.1
	40	2.9	4.0	5.9	7.2	9.0	10.6	12.3	13.7
	50	2.8	4.0	5.9	7.1	8.9	10.5	12.2	13.6
	300	2.3	2.9	3.7	4.5	5.4	6.3	6.9	7.3
	450	1.8	2.0	2.4	3.0	3.6	4.4	4.8	5.1
	550	1.5	1.4	1.6	2.0	2.4	3.1	3.3	3.6
	750	0.9	0.7	0.8	0.9	1.2	1.7	1.7	1.9
870	0.6	0.5	0.6	0.6	0.7	1.2	1.1	1.2	
1000	0.6	0.5	0.5	0.5	0.5	0.6	0.8	0.8	0.9
Forward Response Flatness (dB max)	--	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5

\*The insertion loss specifications shown are in addition to the nominal tap value loss.  
Specifications are subject to change without notice.

FFT\*-\*P Series

Return Path Attenuator Plug-In Module

Specifications: 5-1000 MHz

Specification	Freq. (MHz)	T-RPA/S-2	T-RPA/S-4	T-RPA/S-6	T-RPA/S-8	T-RPA/S-10
Return Bandwidth (MHz)	--	5-40	5-40	5-40	5-40	5-40
Return Attenuation (dB nominal)	5-40	2.5	4.5	6.5	8.5	10.5
Tolerance (± dB max)	5-30	1.0	1.0	1.0	1.0	1.5
	31-40	4.0	4.0	4.0	4.0	4.0
Drop Insertion Loss* (dB nominal)	5	2.5	4.5	6.6	8.6	10.9
	30	3.4	5.2	7.1	8.9	11.0
	40	5.7	7.5	9.7	11.4	13.8
	52	1.5	1.5	1.5	1.4	1.6
	54	1.2	1.2	1.2	1.1	1.2
	100	0.3	0.3	0.3	0.2	0.3
	300	0.2	0.2	0.2	0.1	0.2
	450	0.3	0.3	0.3	0.2	0.3
	550	0.3	0.4	0.3	0.3	0.3
	750	0.4	0.4	0.4	0.3	0.4
870	0.4	0.4	0.4	0.4	0.4	
1000	0.5	0.5	0.5	0.4	0.5	

\*The insertion loss specifications shown are in addition to the nominal tap value loss.  
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**FFT\*-\*P  
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**FFT\*-\*P Series    Return Path Attenuator Plug-In Module    Specifications: 5-1000 MHz**

Specification	Freq. (MHz)	T-RPA/S-12	T-RPA/S-14	T-RPA/S-16	T-RPA/S-18
<b>Return Bandwidth (MHz)</b>	--	5-40	5-40	5-40	5-40
<b>Return Attenuation (dB nominal)</b>	5-40	12.5	14.5	16.5	18.5
<b>Tolerance (± dB max)</b>	5-30 31-40	1.5 4.0	1.7 4.0	1.8 4.0	2.5 4.0
<b>Drop Insertion Loss* (dB nominal)</b>	5	12.8	14.6	16.5	18.8
	30	12.8	14.5	16.0	17.8
	40	15.9	17.8	19.7	21.7
	52	1.4	1.7	1.7	1.7
	54	1.1	1.2	1.2	1.2
	100	0.3	0.3	0.3	0.3
	300	0.1	0.1	0.1	0.2
	450	0.2	0.2	0.2	0.3
	550	0.3	0.3	0.3	0.4
	750	0.3	0.3	0.3	0.4
870	0.4	0.4	0.4	0.4	
1000	0.4	0.4	0.4	0.5	

*\*The insertion loss specifications shown are in addition to the nominal tap value loss.  
Specifications are subject to change without notice.*

**FFT\*-\*P Series    High Pass Filter Plug-In Module    Specifications: 5-1000 MHz**

Specification	Freq. (MHz)	T-HP/S-52
<b>Pass Bandwidth (MHz)</b>	54-1000	--
<b>Drop Insertion Loss* (dB max)</b>	54	1.2
	100	0.6
	1000	0.5
<b>Reject Bandwidth (MHz)</b>	5-40	--
<b>Drop Insertion Loss* (dB min)</b>	5-30	45
	31-40	16
<b>Drop Insertion Loss* (dB nominal)</b>	5	52.7
	10	49.4
	40	16.4
	50	1.7
	100	0.3
	300	0.2
	450	0.2
	550	0.2
750	0.2	
870	0.3	

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	1000	0.3
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FFT\*-\*P Series

Cable Simulator Plug-In Module

Specifications: 5-1000 MHz

Specification	Freq. (MHz)	T-CS-3 (2,4, & 8 tap)	T-CS-6 (2,4 & 8 tap)	T-CS-9 (2 & 4 tap)	T-CS-9 (8 tap)	T-CS-12 (2 & 4 tap)	T-CS-12 (8 tap)
Cable Simulator Value (dB nominal)	870	3.0	6.0	9.0	10.2	12.0	13.4
Drop Insertion Loss* (dB max)	5-108	0.5	0.5	0.5	0.5	0.5	0.5
	870	3.3	5.8	9.3	10.7	11.5	13.9
Drop Insertion Loss* (dB nominal)	5	0.1	0.1	0.1	0.1	0.1	0.1
	10	0.1	0.1	0.1	0.1	0.1	0.1
	40	0.1	0.1	0.1	0.1	0.1	0.1
	50	0.1	0.1	0.1	0.1	0.1	0.1
	108	0.3	0.2	0.3	0.3	0.4	0.4
	300	1.4	1.6	1.9	2.0	2.5	2.7
	450	2.1	2.9	3.7	3.9	4.7	5.2
	550	2.4	3.7	4.9	5.3	6.3	6.9
	750	2.9	5.0	7.5	8.1	9.5	11.0
	870	3.1	5.6	9.2	10.2	11.4	13.4
1000	3.3	6.1	11.2	12.1	14.3	15.1	
Forward Response Flatness (dB max)	--	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5

*\*The insertion loss specifications shown are in addition to the nominal tap value loss. Please note, the insertion loss values are different for the T-CS-9 and T-CS-12 within the 2 & 4 way tap vs. the 8-way tap.  
Specifications are subject to change without notice.*

# ADVANCED SYSTEM DESIGN PRODUCT SPECIFICATIONS

**FFT\*-\*P  
Taps**

**Full Feature Equalizable**

## FFT\*-\*P SERIES

**Tap to Output  
Isolation, Nominal**

MODEL NO. FFT2-*P	5-10 MHz	10-50 MHz	50-450 MHz	450-600 MHz	600-750 MHz	750-1000 MHz
FFT2-4TP	-	-	-	-	-	-
FFT2-7P	15	20	25	25	20	20
FFT2-10P	18	25	25	25	22	22
FFT2-12P	20	25	23	23	23	23
FFT2-14P	24	25	30	30	27	25
FFT2-17P	27	35	33	33	30	30
FFT2-20P	30	35	40	40	40	35
FFT2-23P	30	37	40	40	40	35
FFT2-26P	36	45	45	45	40	35
FFT2-29P	39	45	45	45	40	35

MODEL NO. FFT4-*P	5-10 MHz	10-50 MHz	50-450 MHz	450-600 MHz	600-750 MHz	750-1000 MHz
FFT4-7TP	-	-	-	-	-	-
FFT4-10P	20	20	25	25	25	25
FFT4-14P	25	20	30	25	25	25
FFT4-15.5P	25	25	30	25	25	25
FFT4-17P	27	27	30	30	30	25
FFT4-20P	30	30	35	35	35	30
FFT4-23P	33	35	40	40	40	35
FFT4-26P	36	40	40	40	40	35
FFT4-29P	39	40	45	45	45	40

MODEL NO. FFT8-*P	5-10 MHz	10-50 MHz	50-450 MHz	450-600 MHz	600-750 MHz	750-1000 MHz
FFT8-10TP	-	-	-	-	-	-
FFT8-14P	20	25	25	25	25	25
FFT8-17P	23	30	30	30	30	25
FFT8-20P	30	30	35	35	35	30
FFT8-23P	30	35	35	35	35	30
FFT8-26P	38	40	40	40	40	35
FFT8-29P	40	45	45	40	40	35

# ADVANCED SYSTEM DESIGN PRODUCT SPECIFICATIONS

**FFT\*-\*P  
Taps**

**Full Feature Equalizable**

## FFT\*-\*P SERIES SPECIFICATIONS

<b>Tap Value:</b>	2-ways	+/- 1.50 dB
	4-ways	+/- 1.50 dB
	8-ways	+/- 2.0 dB

<b>Tap to Tap Isolation:</b>	5-30 MHz	20 dB
	30-750 MHz	25 dB
	750-100 MHz	20 dB

<b>Return Loss:</b>	Tap	10-30 MHz	16 dB
		30-600 MHz	18 dB
		600-1000 MHz	16 dB

<b>Return Loss:</b>	In/Out	5-30 MHz	16 dB
		30-600 MHz	18 dB
		600-1000 MHz	16 dB

<b>Power Passing:</b> 12 amperes maximum (60/90 volts)
<b>Hum Modulation:</b>
Low Frequency Hum: Hum modulation - 70 dB minimum @ 10 amperes (60/90 volts)
High Frequency Transients: Hum modulation - 73 dB for input voltage slew rates below 0.3V/uS.

<b>RFI:</b> 90 dB Minimum
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<b>Dimensions:</b> 4.0 x 2.9 x 5.6 inches (10.2 x 7.4 x 14.2 cm)
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<b>Weight:</b> 1 lb. (0.45 kg)
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### FFT\*-\*P Tap Label Color Codes

<b>dB Value</b>	<b>Background</b>	<b>Lettering</b>
4	Purple	White

# ADVANCED SYSTEM DESIGN PRODUCT SPECIFICATIONS

**FFT\*-\*P  
Taps**

**Full Feature Equalizable**

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7	Green	Black
10	Red	Black
12	Red	Black
14	Yellow	Black
15.5	Yellow	Black
17	White	Black
20	Black	White
23	Orange	White
26	Lt. Orange	Black
29	Lt. Orange	White