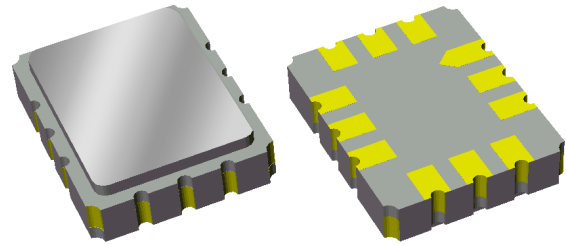


# 856966

## 358.4 MHz SAW Filter

### Applications

- For WCDMA/LTE applications



### Product Features

- Usable bandwidth 24.8 MHz
- Low loss
- High attenuation
- Low EVM
- Balanced operation
- Ceramic Surface Mount Package (SMP)
- Small Size: 7.01 x 5.51 x 1.63 mm
- Hermetic **RoHS** compliant, **Pb-free**

### General Description

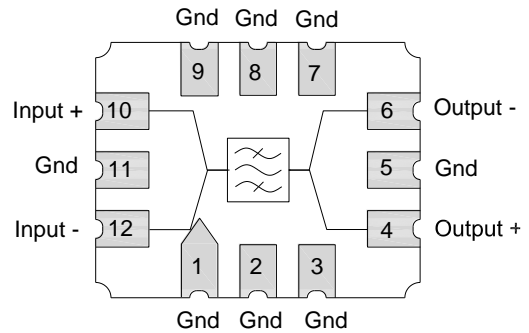
The 856966 is a high-performance IF SAW filter with a center frequency of 358.4MHz and a 1 dB bandwidth of 24.8 MHz.

It features low loss with excellent attenuation, and is designed to be used with a balanced input and output. The small size of this surface mounted filter makes it an economical choice for demanding applications such as WCDMA/LTE or other similar high data rate communications standards.

This device is RoHS compliant and Pb-free.

### Functional Block Diagram

Top view



### Pin Configuration

Pin #	Bal/Bal	Description
10		Input +
12		Input -
4		Output +
6		Output -
1,2,3,5		Ground
7,8,9,11		Ground

### Ordering Information

Part No.	Description
856966	packaged part
856966-EVB	evaluation board

Standard T/R size = 3000 units/reel.

## Specifications

### Electrical Specifications (1, 2)

Specified Temperature Range: <sup>(3)</sup> -15 to +85 °C

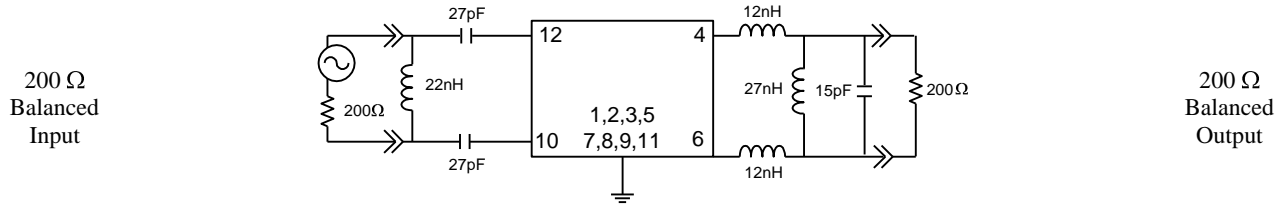
Parameter <sup>(4)</sup>	Conditions	Min	Typical <sup>(5)</sup>	Max	Units
Center Frequency		-	358.4	-	MHz
Insertion Loss	at 358.4 MHz	-	9.0	11.0	dB
Amplitude Variation <sup>(6)</sup>	346.0 – 370.8 MHz	-	0.31	1.0	dB p-p
Absolute Group Delay	346.0 – 370.8 MHz	-	0.45	0.6	μs
Group Delay Variation <sup>(6)</sup>	346.0 – 370.8 MHz	-	25	100	ns p-p
EVM <sup>(7)</sup>	346.0 – 370.8 MHz	-	1.2	3	%
Time side-lobe response attenuation <sup>(8)</sup>	(1.2 – 500 μs)	40	60	-	dB
Input Return Loss	346.0 – 370.8 MHz	10	12.4	-	dB
Output Return Loss	346.0 – 370.8 MHz	10	12.5	-	dB
Rejection/Attenuation <sup>(9)</sup>					
10 – 258.4 MHz		55	71	-	dB
258.4 – 309.9 MHz	(F <sub>0</sub> - 100 to F <sub>0</sub> - 48.5 MHz)	55	59	-	dB
309.9 – 325.4 MHz	(F <sub>0</sub> - 48.5 to F <sub>0</sub> - 33 MHz)	35	50	-	dB
325.4 – 335.8 MHz	(F <sub>0</sub> - 33 to F <sub>0</sub> - 22.6 MHz)	30	35	-	dB
335.8 – 336.4 MHz	(F <sub>0</sub> - 22.6 to F <sub>0</sub> - 22.0 MHz)	25	37	-	dB
336.4 – 336.9 MHz	(F <sub>0</sub> - 22.0 to F <sub>0</sub> - 21.5 MHz)	20	37	-	dB
336.9 – 337.2 MHz	(F <sub>0</sub> - 21.5 to F <sub>0</sub> - 21.2 MHz)	15	37	-	dB
337.2 – 337.6 MHz	(F <sub>0</sub> - 21.2 to F <sub>0</sub> - 20.8 MHz)	10	35	-	dB
337.6 – 338.4 MHz	(F <sub>0</sub> - 20.8 to F <sub>0</sub> - 20 MHz)	5	24	-	dB
378.4 – 379.2 MHz	(F <sub>0</sub> + 20 to F <sub>0</sub> + 20.8 MHz)	5	25	-	dB
379.2 – 379.6 MHz	(F <sub>0</sub> + 20.8 to F <sub>0</sub> + 21.2 MHz)	10	32	-	dB
379.6 – 379.9 MHz	(F <sub>0</sub> + 21.2 to F <sub>0</sub> + 21.5 MHz)	15	35	-	dB
379.9 – 380.4 MHz	(F <sub>0</sub> + 21.5 to F <sub>0</sub> + 22.0 MHz)	20	35	-	dB
380.4 – 381.0 MHz	(F <sub>0</sub> + 22.0 to F <sub>0</sub> + 22.6 MHz)	25	36	-	dB
381.0 – 391.4 MHz	(F <sub>0</sub> + 22.6 to F <sub>0</sub> + 33 MHz)	30	36	-	dB
391.4 – 406.9 MHz	(F <sub>0</sub> + 33 to F <sub>0</sub> + 48.5 MHz)	35	53	-	dB
406.9 – 458.4 MHz	(F <sub>0</sub> + 48.5 to F <sub>0</sub> + 100 MHz)	55	59	-	dB
458.4 – 525.0 MHz	(F <sub>0</sub> + 100 to 525 MHz)	55	70	-	dB
525.0 – 560.0 MHz		65	76	-	dB
560.0 – 675.0 MHz		55	65	-	dB
675.0 – 750.0 MHz		52	56	-	dB
750.0 – 1000 MHz		55	70	-	dB
Source Impedance (balanced) <sup>(10)</sup>		-	200	-	Ω
Load Impedance (balanced) <sup>(10)</sup>		-	200 or 50	-	Ω

#### Notes:

- All specifications are based on the TriQuint schematic for the main reference design shown on page 3
- An external impedance matching network with ±2% tolerance will be necessary to achieve the proposed specifications
- In production, devices will be tested at room temperature to a guardbanded specification to ensure electrical compliance over temperature
- Electrical margin has been built into the design to account for the variations due to temperature drift and manufacturing tolerances
- Typical values are based on average measurements at room temperature
- These Variations are defined as the difference between the lowest loss and the highest loss within the defined frequency points
- Measured with a RRC filtered QPSK modulated signal with a BW of 3.84 MHz placed anywhere within the defined frequency points
- Excluding the triple transit peak at 1.35 μs that may reach 38 dB.
- Relative to insertion loss at center frequency
- This is the optimum impedance in order to achieve the performance shown

**Reference Design – 200Ω Bal Input, 200Ω Bal Output**

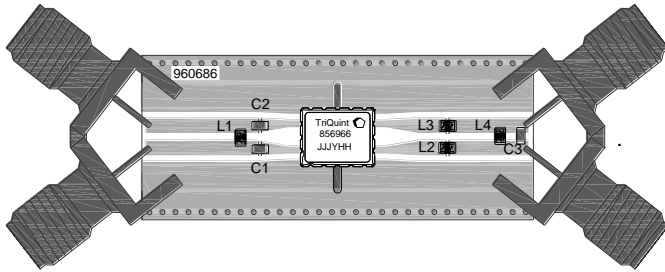
**Schematic**



**Notes:**

- 1. Actual matching values may vary due to PCB layout and parasitic

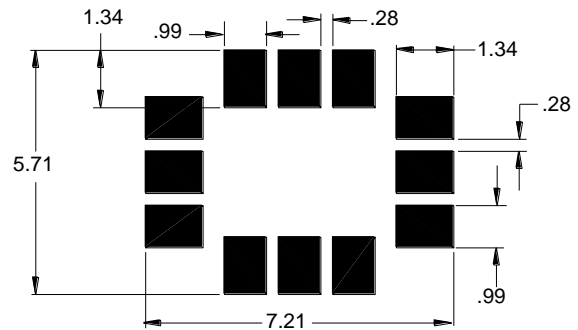
**PC Board**



**Notes:**

- Top, middle & bottom layers: 1 oz copper
- Substrates: FR4 dielectric, .031" thick
- Finish plating: Nickel: 3-8μm thick, Gold: .03-.2μm thick
- Hole plating: Copper min .0008μm thick

**Mounting Configuration**



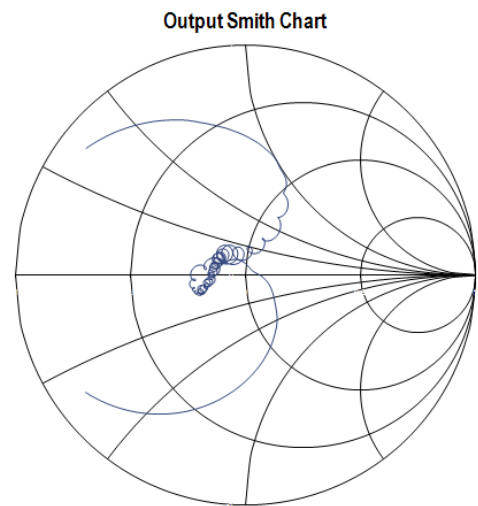
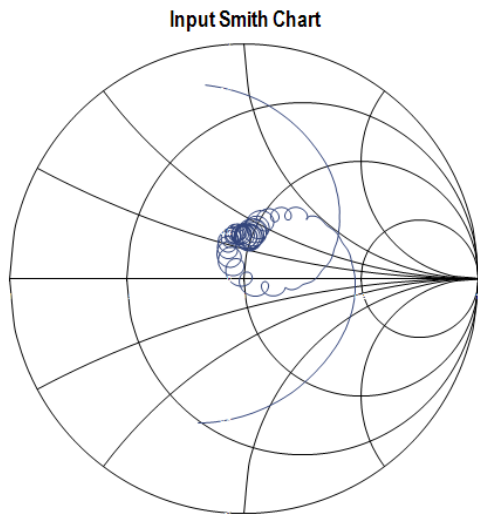
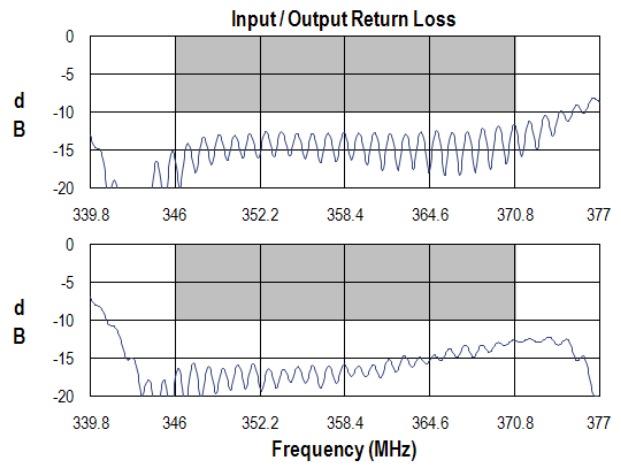
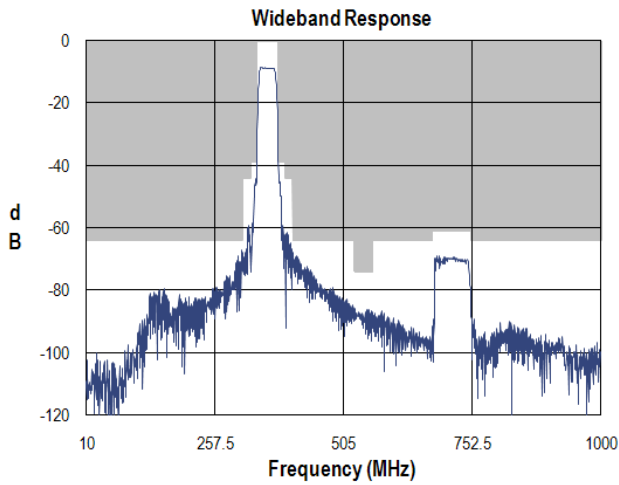
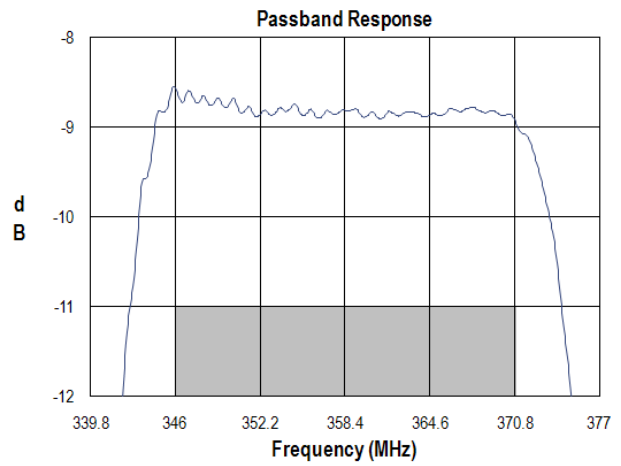
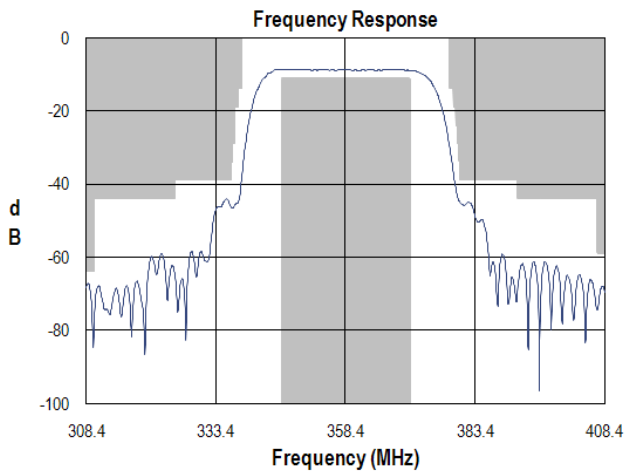
**Notes:**

- 1. All dimensions are in millimeters.
- 2. This footprint represents a recommendation only.

**Bill of Material**

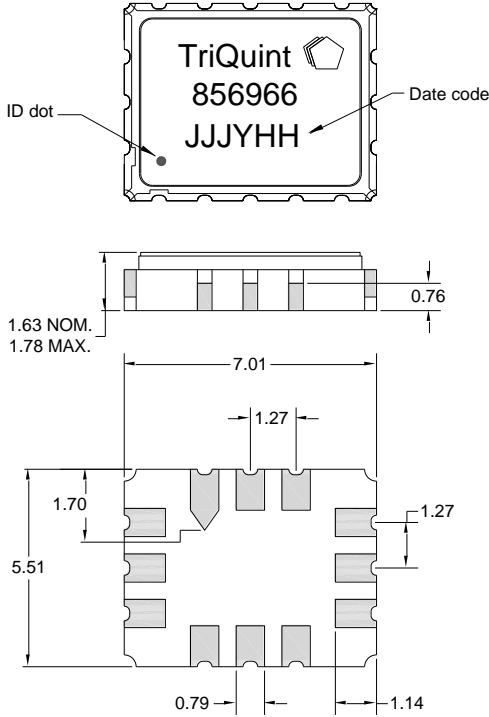
Reference Desg.	Value	Description	Manufacturer	Part Number
L1	22 nH	Coil Wire-wound, 0805, 5%	Coilcraft	0805CS-220XJLC
L2	12nH	Coil Wire-wound, 0805, 5%	Coilcraft	0805CS-120XJLC
L3	12 nH	Coil Wire-wound, 0805, 5%	Coilcraft	0805CS-120XJLC
L4	27nH	Coil Wire-wound, 0805, 5%	Coilcraft	0805CS-270XJLC
C1	27 pF	Chip Ceramic, 0805, 5%	MuRata	GRM40COG270J050BL
C2	27 pF	Chip Ceramic, 0805, 5%	MuRata	GRM40COG270J050BL
C3	15 pF	Chip Ceramic, 0805, 5%	MuRata	GRM40COG150J050BL
SMA	N/A	SMA connector	Johnson Components	142-0701-801
PCB	N/A	3-layer	multiple	960686

### Typical Performance (at room temperature)



**Mechanical Information**

**Package Information, Dimensions and Marking**



Package Style: SMP-28B  
 Dimensions: 7.01 x 5.51 x 1.63 mm

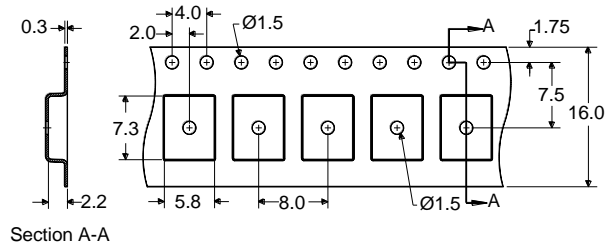
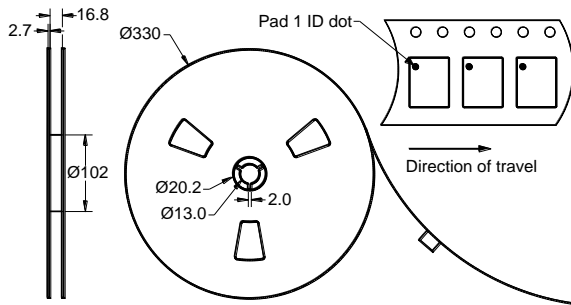
Body:  $Al_2O_3$  ceramic  
 Lid: Kovar, Ni plated  
 Terminations: Au plating 0.5 - 1.0µm, over a 2-6µm Ni plating

All dimensions shown are nominal in millimeters  
 All tolerances are ±0.15mm except overall length and width ±0.10mm

The date code consists of: day of the current year (Julian, 3 digits), Y = last digit of the year (1 digit), and HH = hour (2 digits)

**Tape and Reel Information**

Standard T/R size = 3000 units/reel. All dimensions are in millimeters



**Absolute Maximum Ratings**

Parameter	Rating
Operating Temperature	-15 to +85 °C
Storage Temperature	-40 to +85 °C
Input Power	+19 dBm, 24 hours at 50°C, in band; +25 dBm, 24 hours at 50°C, out of band

Operation of this device outside the parameter ranges given above may cause permanent damage.

## Product Compliance Information

### ESD Information



#### Caution! ESD-Sensitive Device

ESD Rating: 0

Value: Passes  $\geq 200$  V min.  
 Test: Human Body Model (HBM)  
 Standard: JEDEC Standard JESD22-A114

ESD Rating: A

Value: Passes  $\geq 150$ V min.  
 Test: Machine Model (MM)  
 Standard: JEDEC Standard JESD22-A115

### MSL Rating

Devices are Hermetic, therefore MSL is not applicable

### Solderability

Compatible with the latest version of J-STD-020, lead free solder, 260°C

Refer to Soldering Profile for recommended guidelines.

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ( $C_{15}H_{12}Br_4O_2$ ) Free
- PFOS Free
- SVHC Free

## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

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**Email:** [info-sales@tqs.com](mailto:info-sales@tqs.com)      **Fax:** +1.407.886.7061

For technical questions and application information:

**Email:** [flapplication.engineering@tqs.com](mailto:flapplication.engineering@tqs.com)

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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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