

October 1991

DATA SHEET

FUJITSU

F5CB Series

Piezoelectric Filters

SAW-BPF, 700 MHz to 1000 MHz

The F5 series are wide bandpass filters for use in the 700 MHz to 1000 MHz range. The F5 series uses a single lithium tantalate piezoelectric crystal (LiTaO_3) that has a high electromechanical coupling coefficient. The LiTaO_3 also provides wide bandwidths and exceptional stability. Fujitsu's exclusive mounting technique makes the F5 series very compact and surface mountable. The F5 is suitable for use in handheld phones.

- Considerably smaller and lighter than the ceramic filter (volume and weight are reduced by 1/30)
- Surface mount package (SMT)
- Wide variety of bandwidths
- Low insertion loss
- High power rating: 0.2 W guaranteed
- 8-pad ceramic package (LCC)

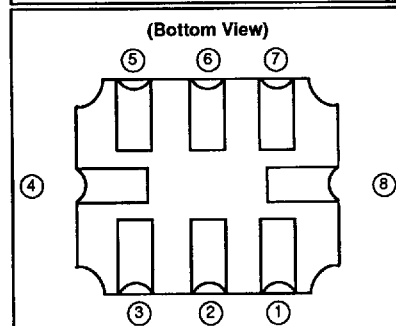
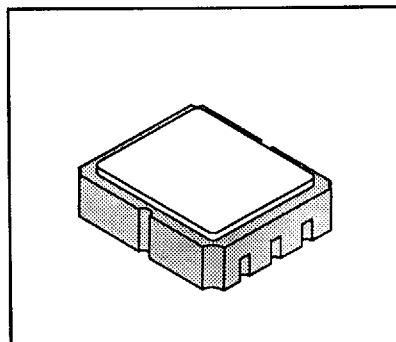
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Operating Temperature	T_a	-30 to 70	°C
Storage Temperature	T_{STG}	-40 to 100	°C
Maximum Input Level	P_{IN}	200	mW
Frequency Range		700 to 1000	MHz

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Ratings	Unit
Operating Temperature	T_a	-30 to 70	°C

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operation sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



Pin No.	Pin Name	Description
1	GND	Ground Pin
2	IN	Input Pin
3	GND	Ground Pin
4	GND	Ground Pin
5	GND	Ground Pin
6	OUT	Output Pin
7	GND	Ground Pin
8	GND	Ground Pin

This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

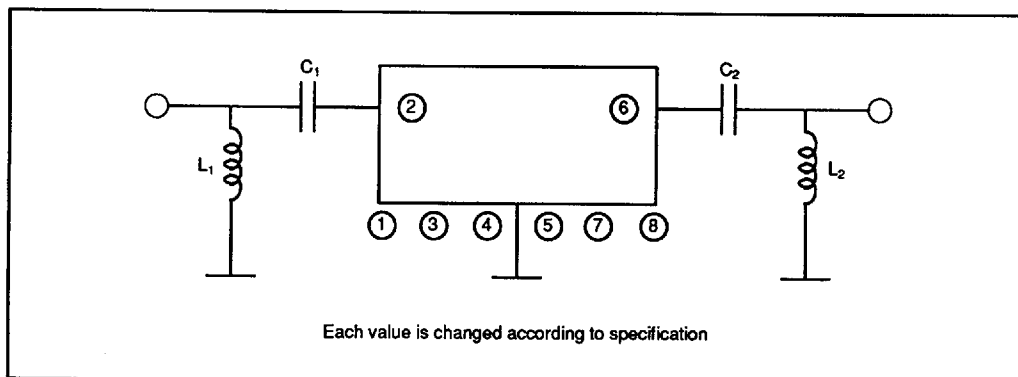
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F5CB Series**STANDARD FREQUENCIES**

Number	Model	System	Use*	Center Frequency (MHz)	Bandwidth (MHz)
1	F5CB-836M50-G201	AMPS/EAMPS	Tx	836.5	25
2	F5CB-881M50-G201	AMPS/EAMPS	Rx	881.5	25
3	F5CB-888M50-G201	ETACS	Tx	888.5	33
4	F5CB-933M50-G202	ETACS	Rx	933.5	33
5	F5CB-902M50-G201	NMT	Tx	902.5	25
6	F5CB-947M50-G201	NMT	Rx	947.5	25
7	F5CB-911M50-G201	NTACS	Tx	911.5	27
8	F5CB-856M50-G201	NTACS	Rx	856.5	27

*Tx = Transmitter; Rx = Receiver

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TEST CIRCUIT

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F5CB Series**ELECTRICAL CHARACTERISTICS – EXAMPLES****Example 1. AMPS Specification (Tx)****Part Number F5CB-836M50-G201** $T_a = -30 \text{ to } 70^\circ\text{C}$

Item	Symbol	Condition	Rating			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	824 to 849 MHz	—	3.5	4.2	dB
In-band Ripple		824 to 849 MHz	—	1.0	1.5	dB
Absolute Out-of-band Attenuation		DC to 800 MHz	20	25	—	dB
		869 to 894 MHz	20	25	—	dB
		894 to 3000 MHz	15	20	—	dB
In-band VSWR		824 to 849 MHz	—	1.7	2.0	
Matching Constants	C_1			7	—	pF
	L_1			9	—	nH
	C_2			6	—	pF
	L_2			11	—	nF

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Example 2. AMPS Specification (Rx)**Part Number F5CB-881M50-G201** $T_a = -30 \text{ to } 70^\circ\text{C}$

Item	Symbol	Condition	Rating			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	869 to 894 MHz	—	—	4.5	dB
In-band Ripple		824 to 849 MHz	—	—	1.5	dB
Absolute Out-of-band Attenuation		DC to 824 MHz	20	—	—	dB
		824 to 849 MHz	20	—	—	dB
		917 to 939 MHz	18	—	—	dB
		947 to 1049 MHz	30	—	—	dB
		1049 to 3000 MHz	15	—	—	dB
In-band VSWR		869 to 894 MHz	—	1.8	2.0	
Matching Constants	C_1			6	—	pF
	L_1			7	—	nH
	C_2			7	—	pF
	L_2			9	—	nF

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F5CB Series**ELECTRICAL CHARACTERISTICS – EXAMPLES** (Continued)

Example 3. ETACS Specification (Tx)
Part Number F5CB-888M50-G201

 $T_a = -30 \text{ to } 70^\circ\text{C}$

Item	Symbol	Condition	Rating			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	872 to 900 MHz	—	4.5	5.0	dB
		900 to 905 MHz	—	5.5	6.5	dB
In-band Ripple		872 to 905 MHz	—	—	2.5	dB
Absolute Out-of-band Attenuation		DC to 847 MHz	20	25	—	dB
		847 to 860 MHz	8	12	—	dB
		917 to 920 MHz	10	13	—	dB
		920 to 922 MHz	13	15	—	dB
		922 to 950 MHz	20	23	—	dB
		962 to 995 MHz	30	33	—	dB
		995 to 3000 MHz	15	20	—	dB
In-band VSWR		872 to 905 MHz	—	2.0	2.5	
Matching Constants	C_1			7	—	pF
	L_1			7	—	nH
	C_2			6	—	pF
	L_2			9	—	nF

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F5CB Series**ELECTRICAL CHARACTERISTICS – EXAMPLES (Continued)****Example 4. ETACS Specification (Rx)****Part Number F5CB-933M50-G201** $T_a = -30 \text{ to } 70^\circ\text{C}$

Item	Symbol	Condition	Rating			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	917 to 947 MHz	—	4.5	5.0	dB
		947 to 950 MHz	—	5.5	6.5	dB
In-band Ripple		917 to 950 MHz	—	1.0	2.5	dB
Absolute Out-of-band Attenuation		DC to 872 MHz	20	25	—	dB
		872 to 900 MHz	15	18	—	dB
		900 to 902 MHz	13	15	—	dB
		902 to 905 MHz	8	13	—	dB
		962 to 965 MHz	10	15	—	dB
		965 to 970 MHz	15	18	—	dB
		970 to 995 MHz	20	25	—	dB
		1005 to 1040 MHz	30	33	—	
		1040 to 3000 MHz	15	20	—	
In-band VSWR		917 to 950 MHz	—	20	2.5	
Matching Constants	C_1			6	—	pF
	L_1			6	—	nH
	C_2			7	—	pF
	L_2			8	—	nF

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Example 5. NMT Specification (Tx)**Part Number F5CB-902M50-G201** $T_a = -30 \text{ to } 70^\circ\text{C}$

Item	Symbol	Condition	Rating			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	890 to 915 MHz	—	4.0	4.5	dB
In-band Ripple		890 to 915 MHz	—	1.3	2.0	dB
Absolute Out-of-band Attenuation		DC to 850 MHz	20	25	—	dB
		850 to 870 MHz	15	22	—	dB
		935 to 960 MHz	20	28	—	dB
		1012 to 1058 MHz	30	33	—	dB
		1058 to 3000 MHz	15	20	—	dB
In-band VSWR		890 to 915 MHz	—	1.5	2.0	
Matching Constants	C_1			5	—	pF
	L_1			6	—	nH
	C_2			6	—	pF
	L_2			9	—	nF

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F5CB Series

ELECTRICAL CHARACTERISTICS – EXAMPLES (Continued)

Example 6. NMT Specification (Rx)
Part Number F5CB-947M50-G201

 $T_a = -30 \text{ to } 70^\circ\text{C}$

Item	Symbol	Condition	Rating			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	935 to 960 MHz	—	4.0	4.5	dB
In-band Ripple		935 to 960 MHz	—	1.3	2.0	dB
Absolute Out-of-band Attenuation		DC to 890 MHz	20	25	—	dB
		890 to 915 MHz	18	22	—	dB
		980 to 1005 MHz	18	30	—	dB
		1012 to 1058 MHz	28	32	—	dB
		1089 to 1115 MHz	30	32	—	dB
		1115 to 3000 MHz	15	20	—	dB
In-band VSWR		935 to 960 MHz	—	1.5	2.0	
Matching Constants	C_1	—	—	6	—	pF
	L_1	—	—	6	—	nH
	C_2	—	—	7	—	pF
	L_2	—	—	9	—	nF

Example 7. NTACS Specification (Tx)
Part Number F5CB-911M50-G201

 $T_a = -30 \text{ to } 70^\circ\text{C}$

Parameter	Symbol	Condition	Specification			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	898-925 MHz	—	4.0	4.5	dB
In-band Ripple		898-925 MHz	—	1.5	2.0	dB
Absolute Out-of-Band Attenuation		DC-815 MHz	25	27	—	dB
		815-870 MHz	22	25	—	dB
		1008-1100 MHz	30	33	—	dB
		1100-3000 MHz	15	20	—	dB
In-band VSWR		898-925 MHz	—	1.8	2.0	
Matching Constants	C_1	—	—	6	—	pF
	L_1	—	—	7	—	nH
	C_2	—	—	5	—	pF
	L_2	—	—	10	—	nH

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F5CB Series**ELECTRICAL CHARACTERISTICS – EXAMPLES** (Continued)

Example 8. NTACS Specification (Rx)
Part Number F5CB-856M50-G201

 $T_a = -30 \text{ to } 70^\circ\text{C}$

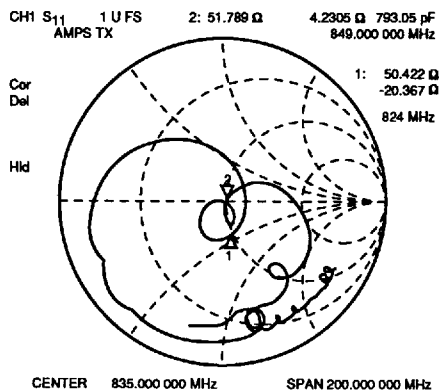
Parameter	Symbol	Condition	Specification			Unit
			Minimum	Typical	Maximum	
Insertion Loss	I_L	843-870 MHz	—	4.0	4.5	dB
In-band Ripple		843-870 MHz	—	1.5	2.0	dB
Absolute Out-of-Band Attenuation		DC-814 MHz	22	25	—	dB
		898-935 MHz	22	25	—	dB
		935-1100 MHz	30	33	—	dB
		1100-3000 MHz	15	20	—	dB
In-band VSWR		843-870 MHz	—	1.8	2.0	
Matching Constants	C_1	—	—	7	—	pF
	L_1	—	—	8	—	nH
	C_2	—	—	7	—	pF
	L_2	—	—	9	—	nH

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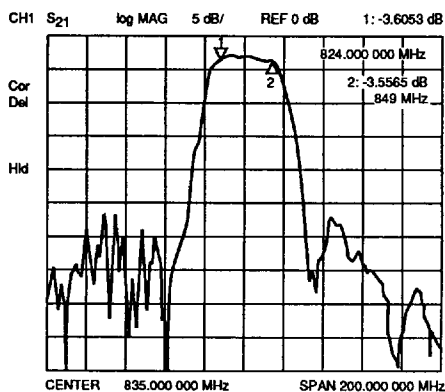
F5CB Series

Below is an example of the AMPS-Tx filter input and output characteristics with compensating L&C components.

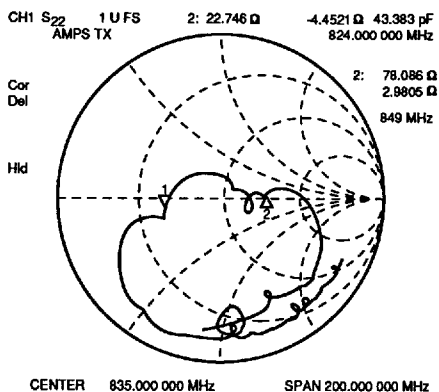
Input with L and C in 50 Ω environment



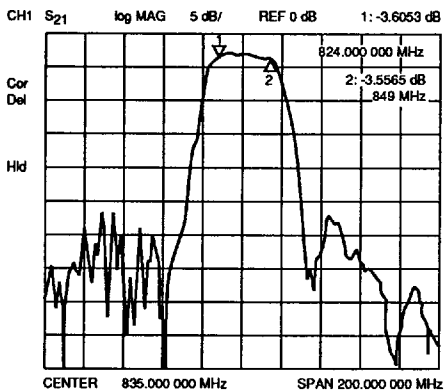
F5CB-836M50-G201



Output with L and C in 50 Ω environment



F5CB-836M50-G201



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F5CB Series**PART NUMBER DESIGNATION****Designation Example**

F5CB - □□□□□□ - G□□□ - □

①

②

③

① Frequency Designation: Specifies the nominal frequency in six alphanumeric characters. Enter M (for MHz) at the decimal point. Refer to STANDARD FREQUENCIES. Example: For an 836.5 MHz device, the frequency designation would show "836M50."

② Serial Number: Specifies a number from 201 to 299 (with 201 as the standard)

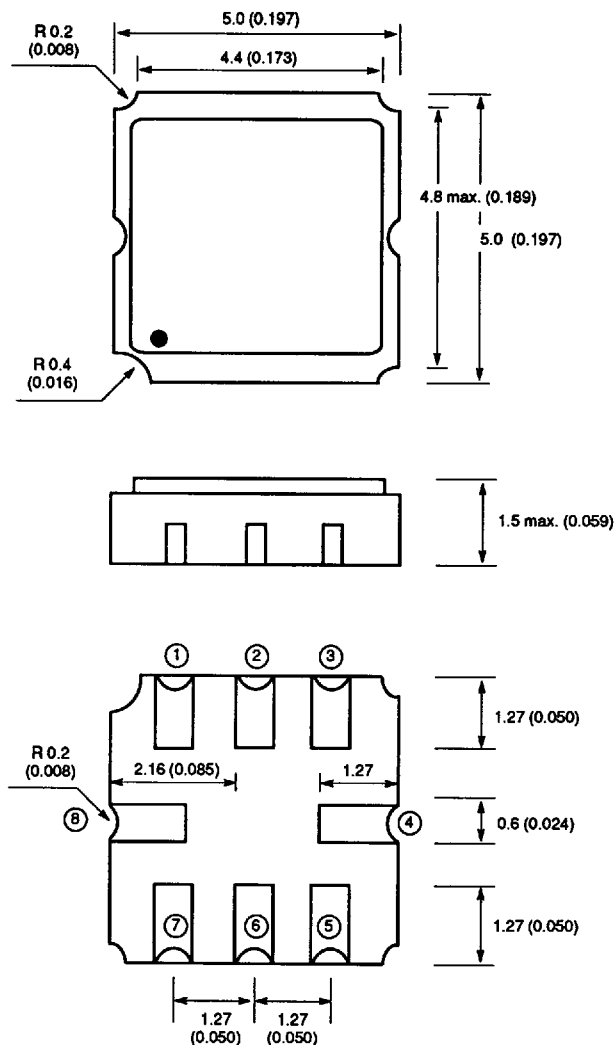
③ Packaging (Reeled tape)

Designation	Contents
T	1K pcs/reel
R	3K pcs/reel

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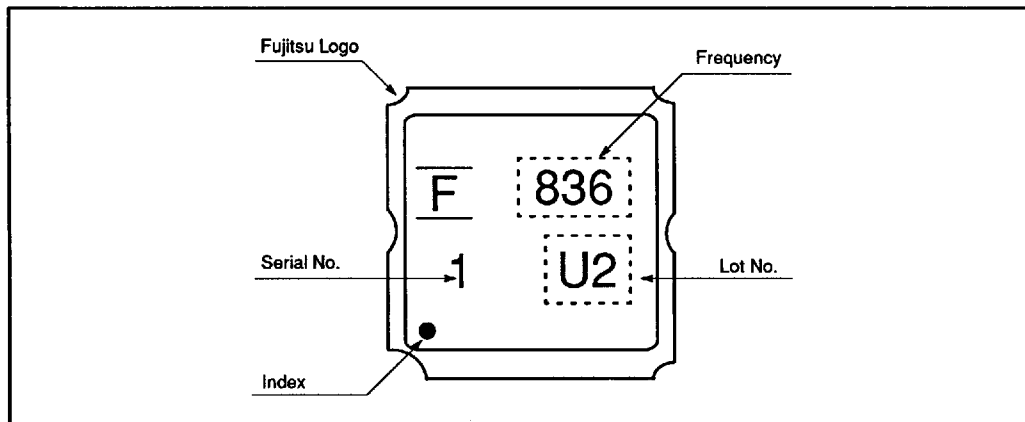
F5CB Series

PACKAGE DIMENSIONS



Unit: mm (inches)

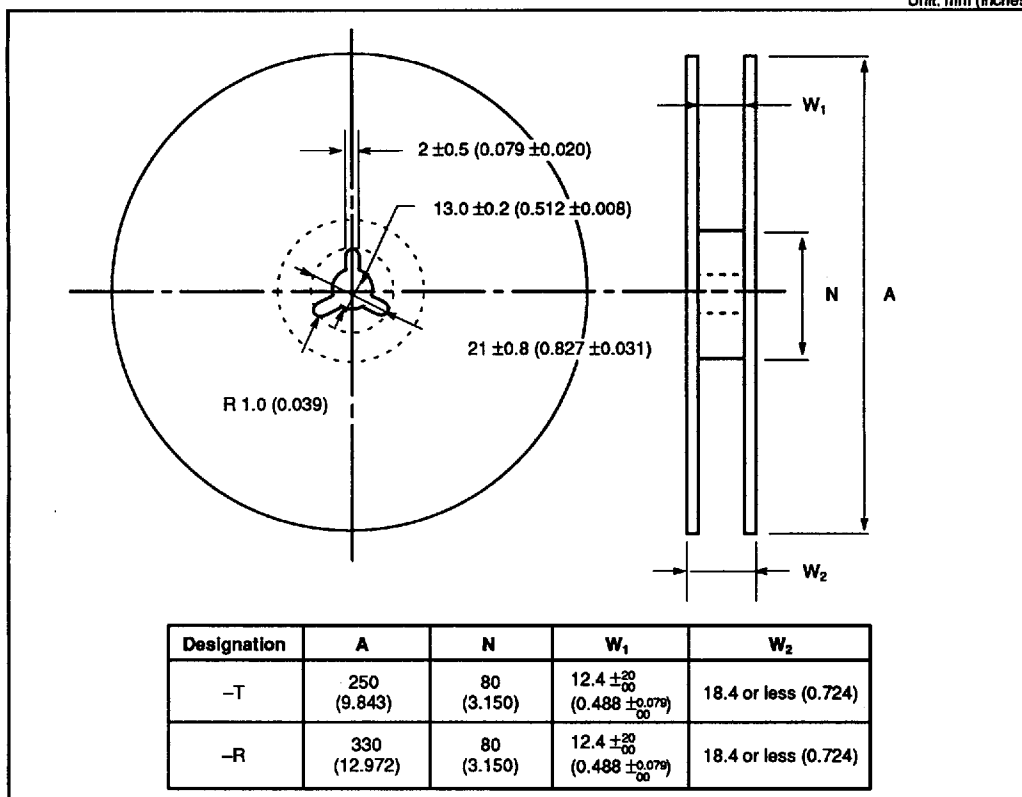
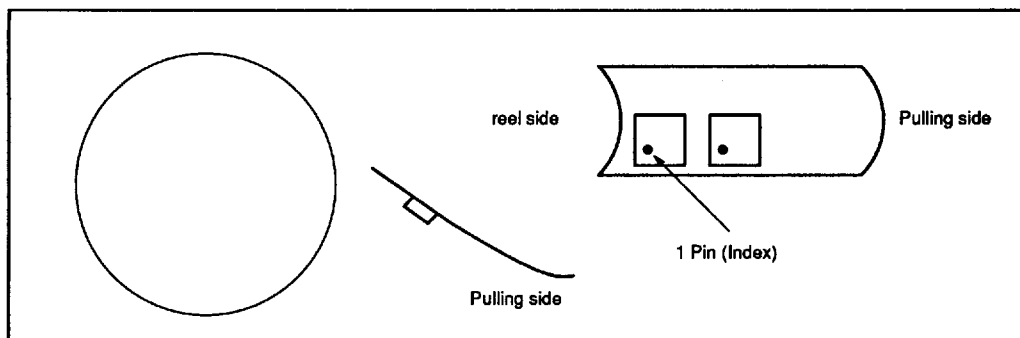
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F5CB Series**PACKAGE MARKING**

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F5CB Series**PACKAGING: Reel Type****1. Reel Dimension**

Unit: mm (inches)

**2. Package Style**

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F5CB Series

PACKAGING: Reel Type (Continued)

3. Tape Dimension

Unit: mm (inches)

