

## Frequency Synthesizers



Coaxial

### Low Phase Noise Frequency Synthesizer 1 to 18GHz

Low Phase Noise Frequency Synthesizers														
P/N	Freq. Range (GHz)	Step Size <sup>2</sup> (MHz)	Power Output (dBm) min	Flatness (dB) Typ.	Phase Noise (dBc/Hz)					Harmonics <sup>4</sup> (dBc) max	Spurious (dBc) max	Switching Speed (us) Typ.	Power Supply <sup>5</sup> (V/mA) max	Case
					Freq. (GHz)	@1 KHz	@10 KHz	@100 KHz	@1 MHz					
MFS1020	1 - 2	10	+10	≤ ±1.5	1	-108	-110	-110	-125	-10	-60	≤ 150	+12/1200	MFS-1
					2	-102	-104	-104	-120				+5/1200	
MFS2040	2 - 4	10	+10	≤ ±1.5	2	-102	-104	-104	-120	-10	-60	≤ 150	+12/1200	MFS-1
					4	-96	-100	-100	-118				+5/1200	
MFS4080	4 - 8	10	+10	≤ ±1.5	4	-96	-100	-100	-118	-10	-60	≤ 150	+12/1400	MFS-1
					8	-90	-94	-94	-105				+5/1400	
MFS80120	8 - 12	10	+10	≤ ±1.5	8	-90	-94	-94	-105	-10	-60	≤ 150	+12/1500	MFS-1
					12	-85	-90	-90	-103				+5/1500	
MFS80180	8 - 18	10	+10	≤ ±1.5	8	-90	-94	-94	-105	-10	-60	≤ 150	+12/1600	MFS-1
					12	-85	-90	-90	-103				+5/1600	
MFS20180	2 - 18	10	+10	≤ ±1.5	2	-102	-104	-104	-120	-10	-60	≤ 150	+12/1600	MFS-1
					4	-96	-100	-100	-118				+5/1800	
MFS20180	2 - 18	10	+10	≤ ±1.5	8	-90	-94	-94	-105	-10	-60	≤ 150	+5/1800	MFS-1
					12	-85	-90	-90	-103				+24/50	
					18	-82	-85	-85	-100					

#### Notes:

1. Narrowband low phase noise frequency synthesizer also available.
2. Step Size: When step size meets 1MHz, phase noise will deteriorate 2-8dB and switching speed will deteriorate 100us.
3. Frequency Stability:  $\pm 1 \times 10^{-7}$  with built-in OCXO or with external reference.
4. Harmonics:  $\leq -55$ dBc with additional switch filter option. (For outline drawing, Pls. refer to MFS-2).
5. Power supply: with switch filter option, additional -5V/200mA power supply will be needed.
6. For Commercial Application: Operating Temperature: -10~+50°C.  
For Industrial Application: Operating Temperature: -20~+60°C.  
For other Application: Operating Temperature: -40~+70°C、-55~+85°C.

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### High Performance DDS Frequency Synthesizer 1 to 18GHz

High Performance DDS Frequency Synthesizers														
P/N	Freq. Range (GHz)	Step Size (Hz)	Power Output (dBm) min	Flatness (dB) Typ.	Phase Noise (dBc/Hz)					Harmonics <sup>3</sup> (dBc) max	Spurious (dBc) max	Switching Speed (us)	Power Supply <sup>4</sup> (V/mA) max	Case
					Freq. (GHz)	@1 KHz	@10 KHz	@100 KHz	@1 MHz					
DFS1020	1 - 2	1	+13	≤ ±1.5	1	-106	-108	-108	-125	-10	-60	≤ 120	+12/1200	DFS-1
					2	-100	-102	-102	-120				+5/1700	
DFS2040	2 - 4	1	+13	≤ ±1.5	2	-100	-102	-102	-120	-10	-60	≤ 120	+12/1200	DFS-1
					4	-92	-94	-94	-118				+5/1700	
DFS4080	4 - 8	1	+13	≤ ±1.5	4	-92	-94	-94	-118	-10	-60	≤ 120	+12/1400	DFS-1
					8	-88	-90	-90	-105				+5/1900	
DFS80180	8 - 18	1	+10	≤ ±1.5	8	-88	-90	-90	-105	-10	-60	≤ 120	+12/1500	DFS-1
					12	-82	-85	-85	-103				+5/2000	
					18	-80	-82	-82	-100				+24/50	
DFS20180	2 - 18	1	+10	≤ ±1.5	2	-100	-102	-102	-120	-10	-60	≤ 120	+12/1600	DFS-1
					4	-92	-94	-94	-118				+5/2100	
					8	-88	-90	-90	-105				+24/50	
					18	-80	-82	-82	-100					

#### Notes:

1. Narrowband high performance DDS frequency synthesizer also available.
2. Frequency Stability:  $\pm 1 \times 10^{-7}$  with built-in OCXO or with external reference.
3. Harmonics:  $\leq -55$ dBc with additional switch filter option. (For outline drawing, Pls. refer to DFS-2).
4. Power supply: with switch filter option, additional -5V/200mA power supply will be needed.
5. For Commercial Application: Operating Temperature: -10~+50°C.  
For Industrial Application: Operating Temperature: -20~+60°C.  
For other Application: Operating Temperature: -40~+70°C、-55~+85°C.

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Miniature Frequency Synthesizer 1 to 8GHz

Miniature Frequency Synthesizers														
P/N	Freq. Range (GHz)	Step Size (MHz)	Power Output <sup>2</sup> (dBm) min	Flatness (dB) Typ.	Phase Noise (10 MHz Step Size) (dBc/Hz)				Harmonics <sup>4</sup> (dBc) max	Spurious (dBc) max	Switching Speed <sup>5</sup> (us)	Power Supply (V/mA) Typ.	Case	
					Freq. (GHz)	@1 KHz	@10 KHz	@100 KHz						@1 MHz
					1	2	4	8						
UFS1020	1 - 2	0.1 to 10	+13	≤ ±1.5	1	-104	-106	-106	-125	-10	-65	≤ 40	+18/150	UFS-1
UFS2040	2 - 4	0.1 to 10	+13	≤ ±1.5	2	-98	-100	-100	-120	-10	-65	≤ 40	+18/200	UFS-1
					4	-92	-94	-94	-105					
UFS4080	4 - 8	0.1 to 10	+13	≤ ±1.5	4	-92	-94	-94	-105	-10	-65	≤ 40	+18/250	UFS-1
					8	-86	-88	-88	-100					

Notes:

1. Narrowband Miniature frequency synthesizer also available.
2. Power Output: ≥ +13dBm can be extended to dual outputs.
3. Frequency Stability: ±3x10<sup>-6</sup> with built-in TCXO or with external reference.
4. Harmonics: ≤ -30~-50dBc with frequency range <80% octave.
5. Switching Speed: ≤ 40us (10MHz Step Size)
6. For Commercial Application: Operating Temperature: -10~+50°C.  
For Industrial Application: Operating Temperature: -20~+60°C.  
For other Application: Operating Temperature: -40~+70°C、-55~+85°C.

Fractional Frequency Synthesizer 0.5 to 4GHz

Fractional Frequency Synthesizers													
P/N	Freq. Range (GHz)	Step Size (KHz)	Power Output <sup>2</sup> (dBm) min	Flatness (dB)	Phase Noise(Narrowband) (dBc/Hz)				Harmonics (dBc) max	Spurious (dBc) max	Switching Speed (us)	Power Supply (V/mA) Typ.	Case
					Freq. (GHz)	@10 KHz	@100 KHz	@1 MHz					
					0.5	1	2	4					
KFS0540	0.5 - 4	1-100	+13	≤ ±0.5	0.5	-100	-117	-135	-45	-60	≤ 200	+12/100	KFS-1
					1	-95	-115	-130					
					2	-87	-100	-120					
					4	-80	-90	-110					

Notes:

1. Fractional Frequency Synthesizer has better spurious when it operates in narrowband.
2. Power Output: ≥ +13dBm can be extended to dual outputs.
3. Frequency Stability: ±3x10<sup>-6</sup> with built-in TCXO or with external reference.
4. For Commercial Application: Operating Temperature: -10~+50°C.  
For Industrial Application: Operating Temperature: -20~+60°C.  
For other Application: Operating Temperature: -40~+70°C、-55~+85°C.

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### SMD Frequency Synthesizer 1 to 8GHz

SMD Frequency Synthesizers														
P/N	Freq. Range (GHz)	Step Size (MHz)	Power Output (dBm) min	Flatness (dB) Typ.	Phase Noise (10MHz Step Size) (dB c/Hz)					Harmonics <sup>3</sup> (dBc) max	Spurious (dBc) max	Switching Speed <sup>4</sup> (us)	Power Supply (V mA) Typ.	Case
					Freq. (GHz)	@1 KHz	@10 KHz	@100 KHz	@1 MHz					
SFS1020	1 - 2	0.1 to 10	+10	≤ ±1.5	1	-104	-106	-106	-125	-10	-65	≤ 40	+12/50	SFS-1
					2	-98	-100	-100	-120				+12/100	
SFS2040	2 - 4	0.1 to 10	+10	≤ ±1.5	2	-98	-100	-100	-120	-10	-65	≤ 40	+12/100	SFS-1
					4	-92	-94	-94	-105				+12/150	
SFS4080	4 - 8	0.1 to 10	+10	≤ ±1.5	4	-92	-94	-94	-105	-10	-65	≤ 40	+12/100	SFS-1
					8	-86	-88	-88	-100				+12/200	

#### Notes:

1. Narrowband SMD Frequency Synthesizer also available
2. Frequency Stability:  $\pm 3 \times 10^{-6}$  with built-in TCXO or with external reference
3. Harmonics:  $\leq -30 \sim -50$  dBc with frequency range <80% octave
4. Switching Speed:  $\leq 40$  us (10MHz Step Size)
5. For Commercial Application: Operating Temperature:  $-10 \sim +50^\circ\text{C}$   
 For Industrial Application: Operating Temperature:  $-20 \sim +60^\circ\text{C}$   
 For other Application: Operating Temperature:  $-40 \sim +70^\circ\text{C}$ ,  $-55 \sim +85^\circ\text{C}$

### Miniature Fast Switching Synthesizer 0.4 to 2.8GHz

Miniature Fast Switching Synthesizers														
P/N	Freq. Range (MHz)	Step Size (MHz)	Power Output (dBm) min	Flatness (dB) Typ.	Phase Noise (dB c/Hz)					Harmonics <sup>4</sup> (dBc) max	Spurious (dBc) max	Switching Speed (ns)	Power Supply (V/mA) Typ.	Case
					Freq. (MHz)	@1 KHz	@10 KHz	@100 KHz	@1 MHz					
MFSS04055	400-550	10	+13	≤ ±1.5	400	-106	-108	-125	-140	-10	-60	≤ 50	+3.3/800	TBD
					550	-106	-108	-125	-140				+5/200	
MFSS0924	900-2400	100	+13	≤ ±1.5	900	-100	-102	-110	-120	-10	-60	≤ 50	+3.3/800	TBD
					2400	-96	-98	-110	-120				+5/200	
MFSS1328	1300-2800	100	+13	≤ ±1.5	1300	-100	-102	-110	-120	-10	-60	≤ 50	+3.3/800	TBD
					1800	-96	-98	-110	-120				+5/200	

#### Notes:

1. Narrowband Miniature Fast Switching Synthesizer also available
2. Max Frequency Point is 16.
3. Frequency Stability:  $\pm 3 \times 10^{-6}$  with built-in TCXO or with external reference
4. Harmonics:  $\leq -30 \sim -50$  dBc with frequency range <80% octave
5. For Commercial Application: Operating Temperature:  $-10 \sim +50^\circ\text{C}$   
 For Industrial Application: Operating Temperature:  $-20 \sim +60^\circ\text{C}$   
 For other Application: Operating Temperature:  $-40 \sim +70^\circ\text{C}$ ,  $-55 \sim +85^\circ\text{C}$

# Microwave RF Components

## Frequency Synthesizers



Coaxial

### Wideband High Speed Synthesizer 0.01 to 18GHz

Wideband High Speed Synthesizers														
P/N	Freq. Range (GHz)	Step Size (MHz)	Power Output (dBm) min	Flatness (dB) Typ.	Phase Noise (dBc/Hz)					Harmonics (dBc) max	Spurious (dBc) max	Switching Speed (ns)	Power Supply (V/mA) Typ.	Case
					Freq. (GHz)	@1 KHz	@10 KHz	@100 KHz	@1 MHz					
WHSS00120	0.01-2	0.1	+13	$\leq \pm 1.5$	0.01	-140	-145	-148	-	-50	-65	$\leq 200$	TBD	
					2	-110	-112	-120	-140					
WHSS20180	2-18	0.1 to 10	+13	$\leq \pm 1.5$	2	-110	-112	-120	-140	-50	-65	$\leq 200$	TBD	
					18	-90	-92	-100	-120					
WHSS001180	0.01-18	0.1 to 10	+13	$\leq \pm 1.5$	0.01	-140	-145	-148	-	-50	-65	$\leq 200$	TBD	
					18	-90	-92	-100	-120					

#### Notes:

1. Wideband High Speed Synthesizer also available.
2. Frequency Stability:  $\pm 1 \times 10^{-7}$  with built-in OCXO or with external reference.
3. For Commercial Application: Operating Temperature:  $-10 \sim +50^\circ\text{C}$ .  
For Industrial Application: Operating Temperature:  $-20 \sim +60^\circ\text{C}$ .  
For other Application: Operating Temperature:  $-40 \sim +70^\circ\text{C}$ .

### PXI RF Signal Generators 0.01 to 18GHz

PXI RF Signal Generators														
P/N	Freq. Range (GHz)	Step Size (Hz)	Power Output (dBm) min	Flatness (dB) Typ.	Phase Noise (dBc/Hz)					Harmonics (dBc) max	Spurious (dBc) max	Switching Speed (ms)	Power Supply (V/mA) Typ.	Case
					Freq. (GHz)	@1 KHz	@10 KHz	@100 KHz	@1 MHz					
PRSG00120	0.01-2	1	+13	$\leq \pm 1.5$	0.01	-135	-140	-142	-	-40	-65	2	TBD	
					2	-105	-107	-120	-140					
PRSG20180	2-18	1	+13	$\leq \pm 1.5$	2	-105	-107	-120	-140	-50	-65	2	TBD	
					18	-85	-87	-100	-120					
PRSG001180	0.01-18	1	+13	$\leq \pm 1.5$	0.01	-135	-140	-142	-	-40	-65	2	TBD	
					18	-85	-87	-100	-120					

#### Notes:

1. Narrowband PXI RF Signal Generator also available.
2. Frequency Stability:  $\pm 1 \times 10^{-7}$  with built-in OCXO or with external reference.
3. For Commercial Application: Operating Temperature:  $-10 \sim +50^\circ\text{C}$ .  
For Industrial Application: Operating Temperature:  $-20 \sim +60^\circ\text{C}$ .  
For other Application: Operating Temperature:  $-40 \sim +70^\circ\text{C}$ .

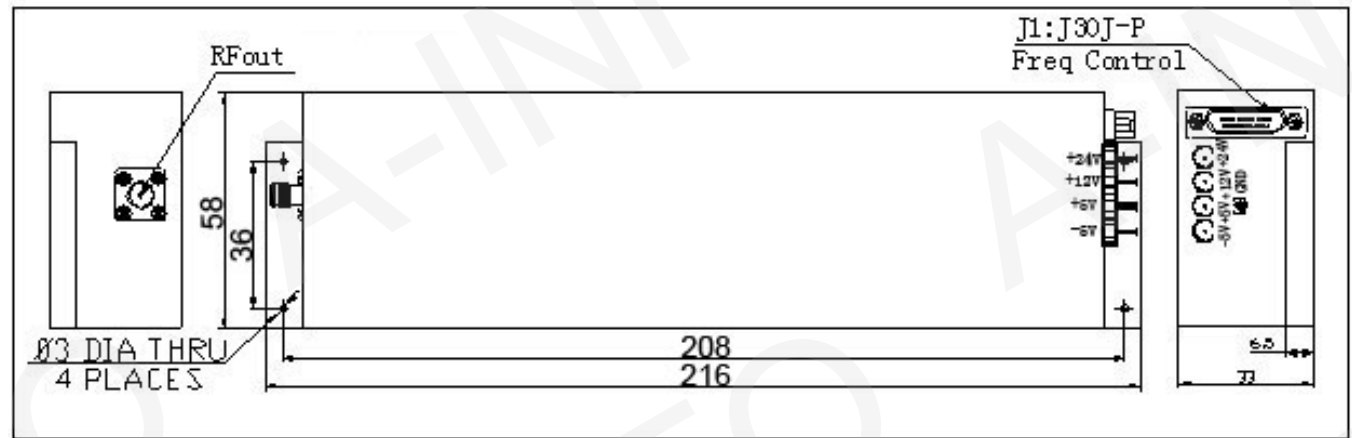
# Microwave/RF Components

## Frequency Synthesizers

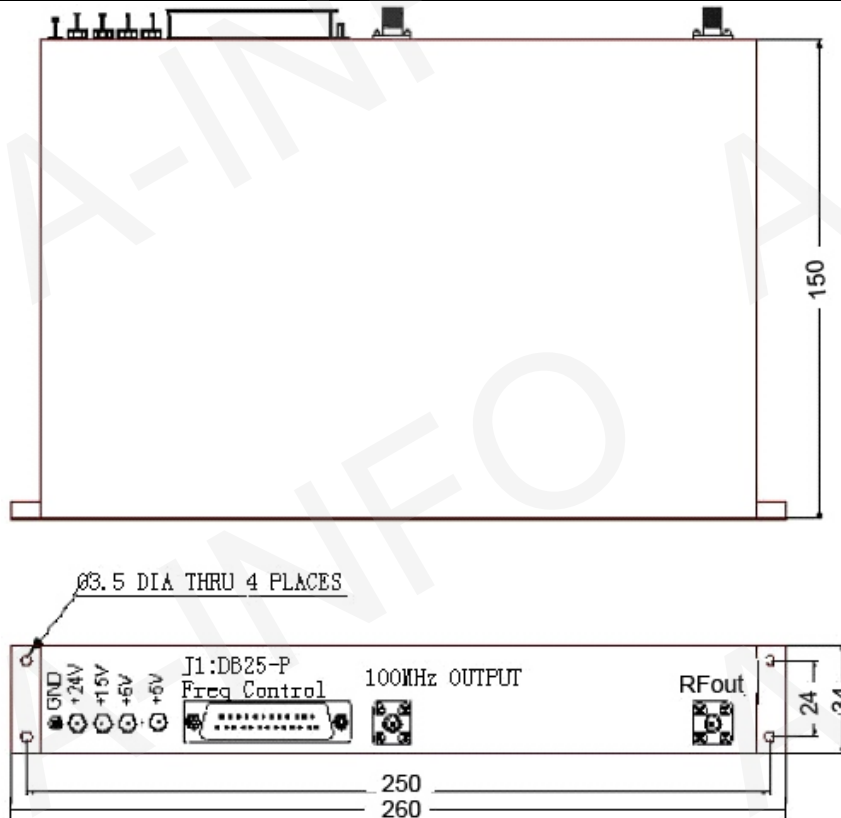
### Outline Drawings(Size: mm)

Frequency Control Port J1: TTL Control (J30J-P or DB25-P)

PIN Number	Item	Description
1-16	F0-F15	Frequency Code F0-F15 3.3-5V level
17	LD	Lock Indication
18-24	NC	NC (Self Test, Non-connection)
25	GND	Ground



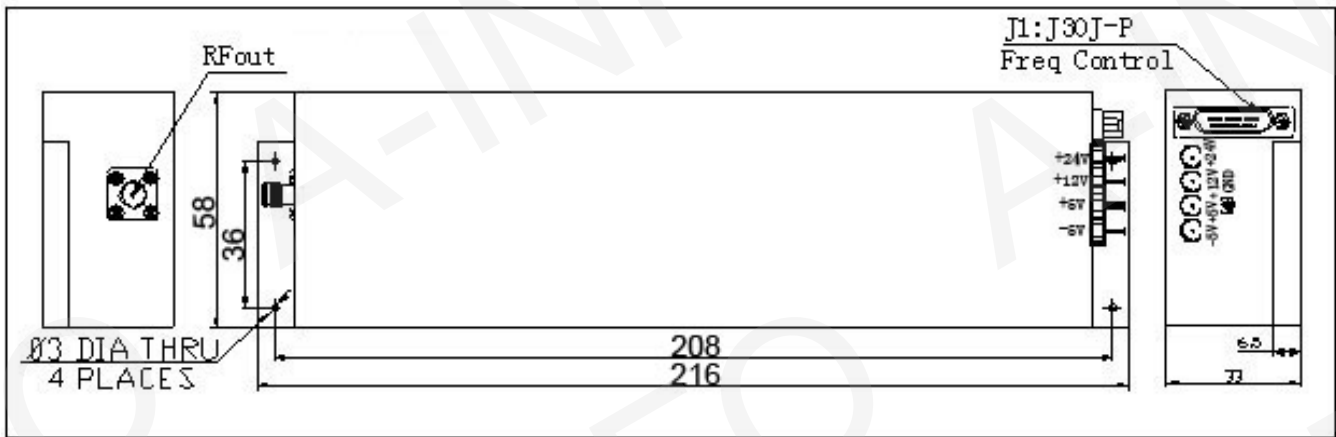
MFS-1



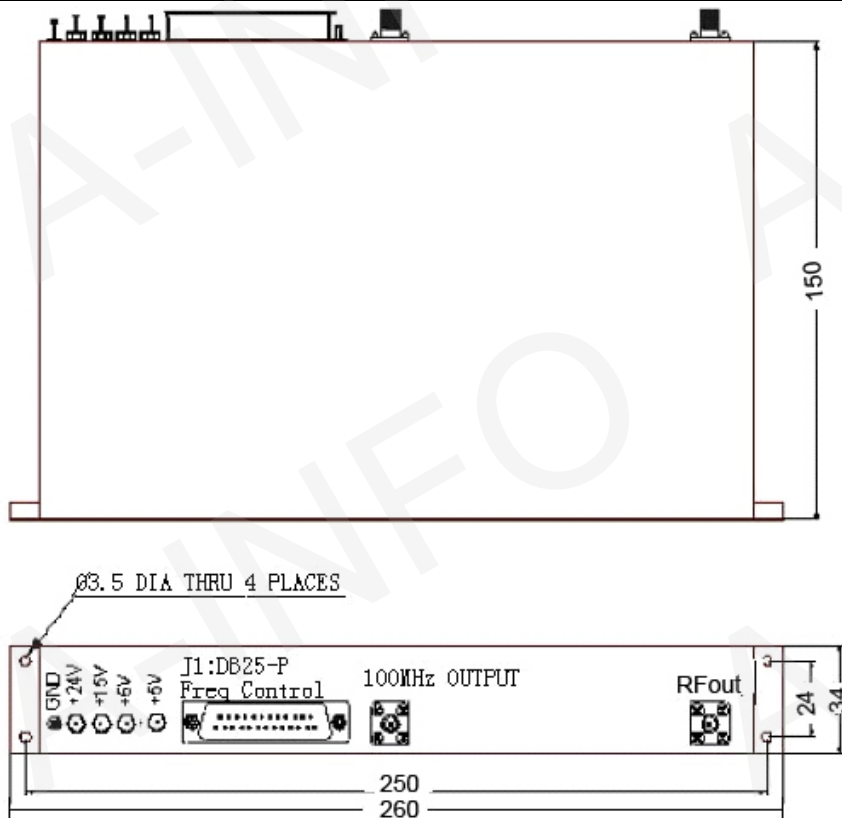
MFS-2(with additional switch filter option)

Frequency Control Port J1: TTL Control (J30J-P or DB25-P)

PIN Number	Item	Description
1-16	F0-F15	Frequency Control, PI0,SPI,RS232,RS485 protocol
17	LD	Lock Indication
18-24	NC	NC (Self Test, Non-connection)
25	GND	Ground



DFS-1



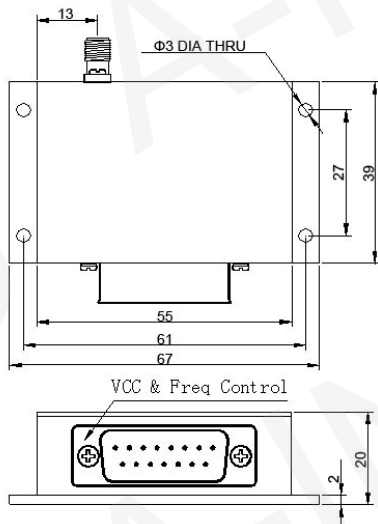
DFS-2(with additional switch filter option)

Frequency Control Port(DB15 PIN)

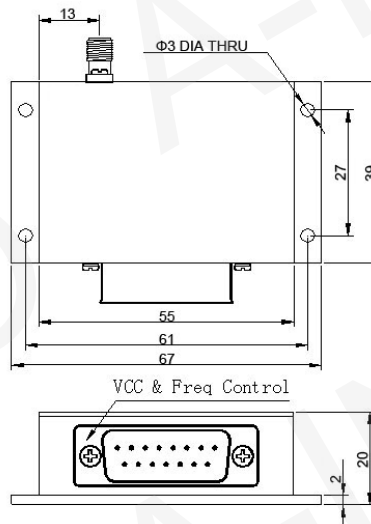
PIN Number	Item	Description
1-9	F0-F8	Parallel Frequency Code F0-F8, 3.3-5V, TTL level
10	GND	Ground
11,12	VCC	Power Supply
13	LD	Lock Indication
14,15	NC	NC(Self Test, Non-connection)

Frequency Control Port(DB15 PIN)

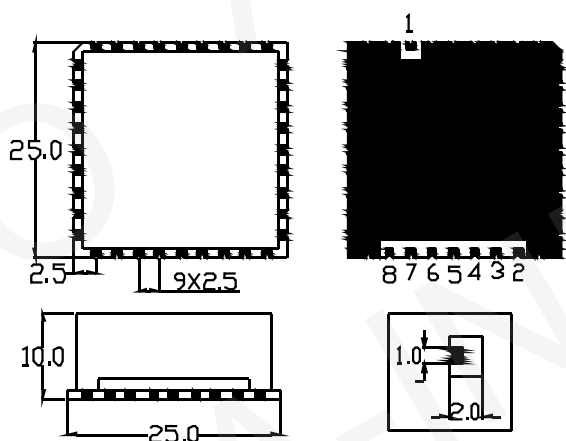
PIN Number	Item	Description
1-9	F0-F8	Frequency Control, PI0, SPI, RS232, RS485 protocol choice
10	GND	Ground
11,12	VCC	Power Supply
13	LD	Lock Indication
14,15	NC	NC(Self Test, Non-connection)



UFS-1



KFS-1



1:RFout	5:LE
2:REFin	6:LD
3:CLK	7:+5V
4:DATA	8:+12V

SFS-1