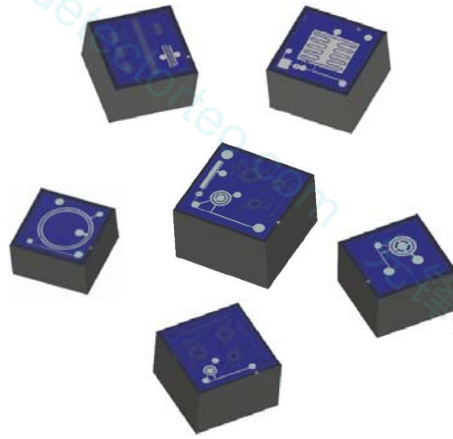


X-RAY

JFETs

# N-Channel Ultra-low Noise JFETs Data Overview



## Contents

• JFET Description	2
• JFET Packages	3
• JFET Drawings	4
• JFET Characteristics	5 - 6
• Noise Graphs	7



452 West 1260 North  
Orem, UT 84057  
P 801.225.0930  
F 801.221.1121

[www.moxtek.com](http://www.moxtek.com)

# N-Channel Ultra-low Noise JFETs

## Data Overview

### JFET Description

MOXTEK ultra low noise JFETs (MX JFETs) are used in a variety of applications including microanalysis, EDXRF, XRD. MOXTEK manufactures 3 and 4 pin N-channel JFETs. MX ultra low noise JFETs have a low leakage current, excellent transconductance ( $g_m$ ) and input capacitance ( $C_{gs}$ ). MOXTEK JFETs are available in Die and other packages (See “JFET Packages” section).

### Features for Optimal Detector Resolution

Ultra low noise  
 Free of generation recombination noise  
 Excellent transconductance ( $g_m$ ) and input capacitance ( $C_{gs}$ )  
 Low leakage current

### Benefits

High Low-Level Signal Amplification  
 High Speed Switching  
 Very high input impedance  
 Excellent gain and very low distortion

### Applications

#### X-ray Detectors

- Si(Li) Detectors
- Si-PIN Detectors
- Silicon Drift Detectors (SDD)

### Products Summary

JFET	$V_{gs(off)}$ typ(V)	$BV_{gss}$ typ(V)	$g_m$ typ(mS)	$I_{dss}$ typ(mA)	$C_{gs}$ typ(pF)
<b>Test Conditions</b>	$V_{sub}=0V$ , $I_d=1nA$	$V_{ds}=0V$ , $I_g=1\mu A$ , $V_{sub}=0V$	$V_{ds}=4V$ , $I_d=5mA$ , 20°C	$V_{gs}=0V$	$V_{ds}=4V$ , $I_d=5mA$
<b>MX-11rc</b>	2.5	25	5	20	0.7
<b>MX-16</b>	10	26	28	300	4
<b>MX-120</b>	9	27	16	64	1.7
<b>MX-16rc</b>	5.5	30	8	52	2.7
<b>MX-20</b>	10	26	8	29	0.9
<b>MX-30</b>	10	31	6	20	0.6
<b>MX-40</b>	9	27	4.5	12	0.4

### JFET Ordering Information

Contact Moxtek TO-72 with can  
 Contact Moxtek Nailhead package  
 Contact Moxtek Teflon package

*Please contact MOXTEK for price and delivery information. Custom packaging is available.*

### Standard Package Includes:

- JFET mounted on a nailhead, TO-72, or Teflon Package
- Each JFET is tested and guaranteed



452 West 1260 North  
 Orem, UT 84057  
 P 801.225.0930  
 F 801.221.1121

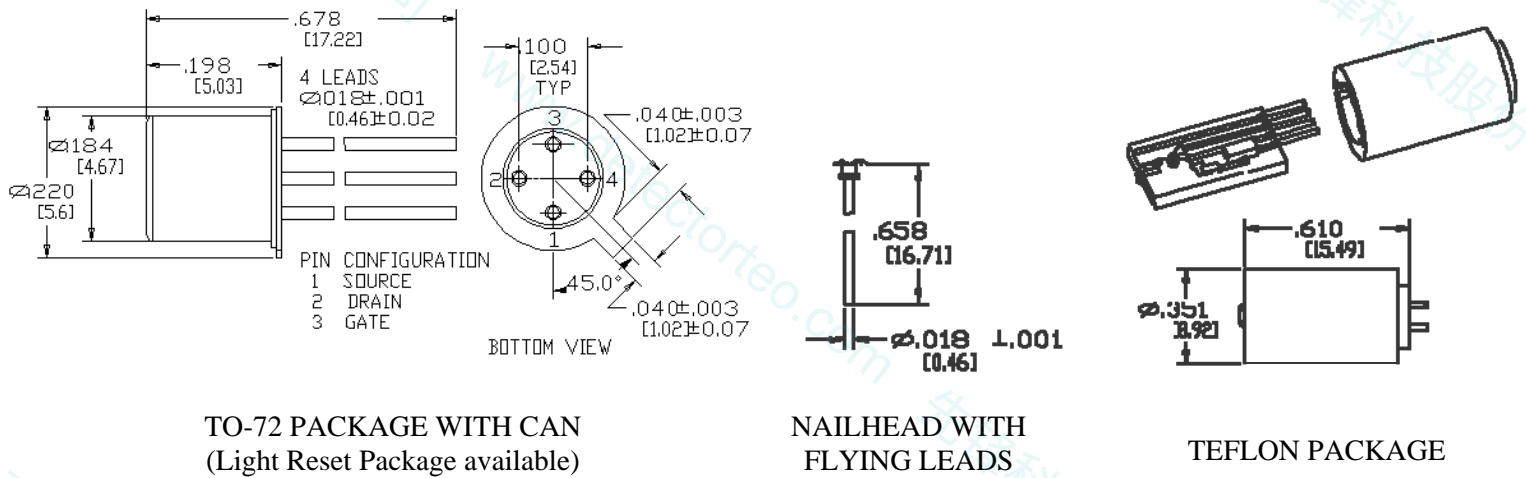
[www.moxtek.com](http://www.moxtek.com)

# N-Channel Ultra-low Noise JFETs

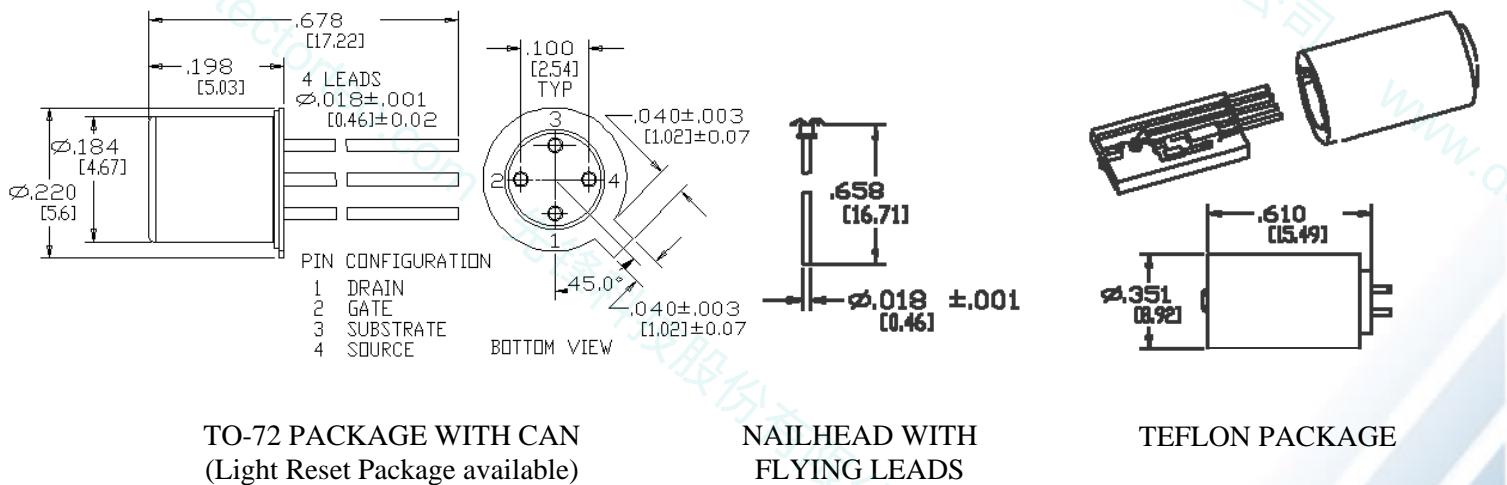
## Data Overview

### JFET Packages

#### MX-11rc JFET Packages



#### MX-16, MX-16rc, MX-30, MX-40, MX-120 JFET Packages



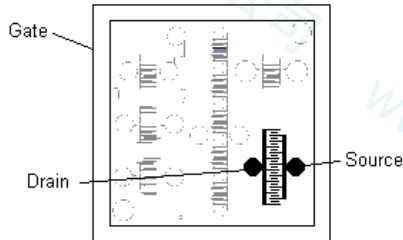
452 West 1260 North  
Orem, UT 84057  
P 801.225.0930  
F 801.221.1121

[www.moxtek.com](http://www.moxtek.com)

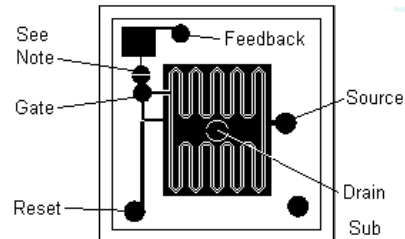
# N-Channel Ultra-low Noise JFETs Data Overview

## JFET Drawings

**MX-11rc JFET**

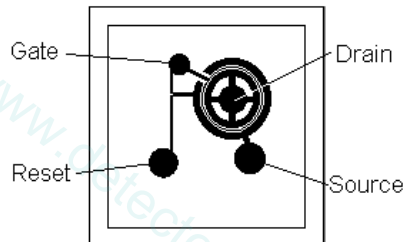


**MX-16, MX-16rc JFET**



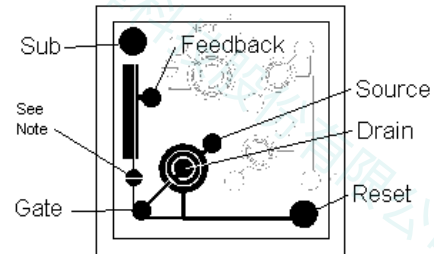
The bottom gate on this 4 terminal JFET is the substrate. Feedback capacitance = 0.5pF  
Feedback and substrate pads are custom and are not generally bonded.

**MX-20 JFET**



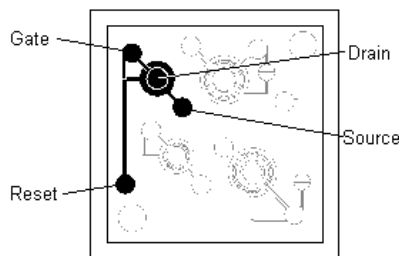
The bottom gate on this 4 terminal JFET is the substrate.

**MX-30 JFET**



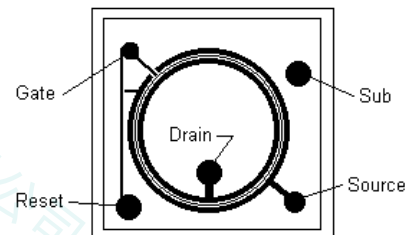
The bottom gate on this 4 terminal JFET is the substrate. Feedback capacitance = 0.5pF  
Feedback and substrate pads are custom and are not generally bonded.

**MX-40 JFET**



The bottom gate on this 4 terminal JFET is the substrate.

**MX-120 JFET**



The bottom gate on this 4 terminal JFET is the substrate. Substrate pad is custom and is not generally bonded.



452 West 1260 North  
Orem, UT 84057  
P 801.225.0930  
F 801.221.1121

[www.moxtek.com](http://www.moxtek.com)

# N-Channel Ultra-low Noise JFETs

## Data Overview

### JFET Characteristics

Static Characteristics												
JFET	Gate-Source Breakdown Voltage			Gate-Source Cutoff Voltage			Drain Saturation Current			Reverse Leakage Current		
	Symbol: $V_{(BV)_{gss}}$ Unit: V			Symbol: $V_{gs(off)}$ Unit: V			Symbol: $I_{dss}$ Unit: mA			Symbol: $I_{gss}$ Unit: pA		
	Test Conditions*: $V_{ds}=0V, I_g=1mA, V_{sub}=0V$			Test Conditions*: $V_{sub}=0V, I_d=1nA$			Test Conditions*: $V_{gs}=0V, V_{sub}=0V$			Test Conditions: $V_{gs} = -10V$		
	Temperature: 20°C			Temperature: 20°C			Temperature: 20°C			Temperature: 20°C		
	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max
MX-11rc	25.0	23.0	25.0	2.4	2.1	2.6	11.0	10.0	13.0	0.7	0.8	0.6
MX-40	27.0	26.0	28.0	9.1	8.7	9.4	12.0	12.0	13.0	0.1	0.2	0.1
MX-30	31.0	30.0	34.0	9.9	8.9	11.6	20.0	18.0	23.0	0.1	0.2	0.0
MX-20	26.0	26.0	27.0	9.8	9.0	10.0	29.0	26.0	32.0	0.6	0.7	0.5
MX-16rc	31.0	28.0	32.0	5.4	4.3	5.9	52.0	44.0	58.0	4.0	8.4	2.8
MX-120	27.0	26.0	27.0	9.3	9.0	10.0	64.0	62.0	70.0	0.2	1.5	0.0
MX-16	26.0	25.0	26.0	9.4	8.9	9.8	299.0	290.0	315.0	0.4	0.6	0.3

Dynamic Characteristics									
JFET	Transconductance			Transconductance			Gate-Source Capacitance		
	Symbol: $g_m$ Unit: mS			Symbol: $g_m$ Unit: mS			Symbol: $C_{gs}$ Unit: pF		
	Test Conditions**: $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions**: $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions**: $I_d=5mA, V_{ds}=4V, V_{gs}=0V$		
	Temperature: 20°C			Temperature: -100°C			Temperature: 20°C		
	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max
MX-11rc	5.4	5.3	5.7	7.8	7.6	8.3	0.7	0.7	0.7
MX-40	4.5	4.3	4.7	5.7	5.4	5.9	0.4	0.4	0.4
MX-30	6.2	6.0	6.4	8.2	7.9	8.5	0.6	0.5	0.6
MX-20	8.0	7.7	8.3	10.7	10.4	11.0	0.9	0.8	1.0
MX-16rc	8.3	8.0	8.5	11.0	10.6	11.3	2.7	2.6	3.0
MX-120	16.6	15.7	17.3	23.2	22.7	24.1	1.7	1.6	1.9
MX-16	28.4	27.5	30.4	40.3	38.8	42.8	4.0	3.8	4.2

\*  $V_{sub}$  bias condition doesn't apply to the MX-11rc JFET

\*\*  $V_{gs}$  bias condition doesn't apply to the MX-11rc JFET



452 West 1260 North  
Orem, UT 84057  
P 801.225.0930  
F 801.221.1121

[www.moxtek.com](http://www.moxtek.com)

# N-Channel Ultra-low Noise JFETs

## Data Overview

Noise Characteristics																				
JFET	Equivalent Voltage Noise																			
	Symbol: $\sqrt{\bar{e}_n^2}$ Unit: nV/ $\sqrt{\text{Hz}}$			Symbol: $\sqrt{\bar{e}_n^2}$ Unit: nV/ $\sqrt{\text{Hz}}$			Symbol: $\sqrt{\bar{e}_n^2}$ Unit: nV/ $\sqrt{\text{Hz}}$			Symbol: $\sqrt{\bar{e}_n^2}$ Unit: nV/ $\sqrt{\text{Hz}}$			Symbol: $\sqrt{\bar{e}_n^2}$ Unit: nV/ $\sqrt{\text{Hz}}$			Symbol: $\sqrt{\bar{e}_n^2}$ Unit: nV/ $\sqrt{\text{Hz}}$				
	Test Conditions : $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions : $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions : $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions : $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions : $V_{ds}=4V, I_d=5mA, V_{gs}=0V$			Test Conditions : $V_{ds}=4V, I_d=5mA, V_{gs}=0V$				
	Temperature: 20°C			Temperature: 20°C			Temperature: 20°C			Temperature: -100°C			Temperature: -100°C			Temperature: -100°C				
	Frequency: 1 kHz			Frequency: 10 kHz			Frequency: 100 kHz			Frequency: 1 kHz			Frequency: 10 kHz			Frequency: 100 kHz				
	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min	Max	Typ	Min
<b>MX-11rc</b>	2.8	2.5	3.1	2.2	2	2.4	2.1	2.0	2.2	2.3	1.9	2.7	1.6	1.5	1.8	1.5	1.4	1.6		
<b>MX-40</b>	3.3	3.1	3.5	2.7	2.6	2.7	2.6	2.5	2.7	3.0	2.8	3.2	2.1	2.1	2.2	2.1	2.0	2.1		
<b>MX-30</b>	2.4	2.3	2.5	2.0	2.0	2.2	2.0	1.9	2.1	2.2	2.1	2.4	1.7	1.6	1.7	1.6	1.5	1.7		
<b>MX-16rc</b>	1.9	1.9	2.0	1.6	1.6	1.7	1.6	1.5	1.6	1.7	1.6	1.8	1.3	1.3	1.3	1.2	1.2	1.3		
<b>MX-20</b>	1.8	1.7	1.9	1.6	1.5	1.7	1.6	1.5	1.7	1.6	1.5	1.7	1.3	1.2	1.3	1.2	1.2	1.3		
<b>MX-120</b>	1.2	1.2	1.3	1.0	1.0	1.1	1.0	1.0	1.1	1.2	1.1	1.4	0.8	0.8	1.1	0.8	0.7	0.9		
<b>MX-16</b>	1.0	1.0	1.2	0.8	0.8	0.8	0.8	0.8	0.7	0.9	0.9	1.0	0.6	0.6	0.6	0.6	0.5	0.6		

\*  $V_{gs}$  bias condition doesn't apply to the MX-11rc JFET

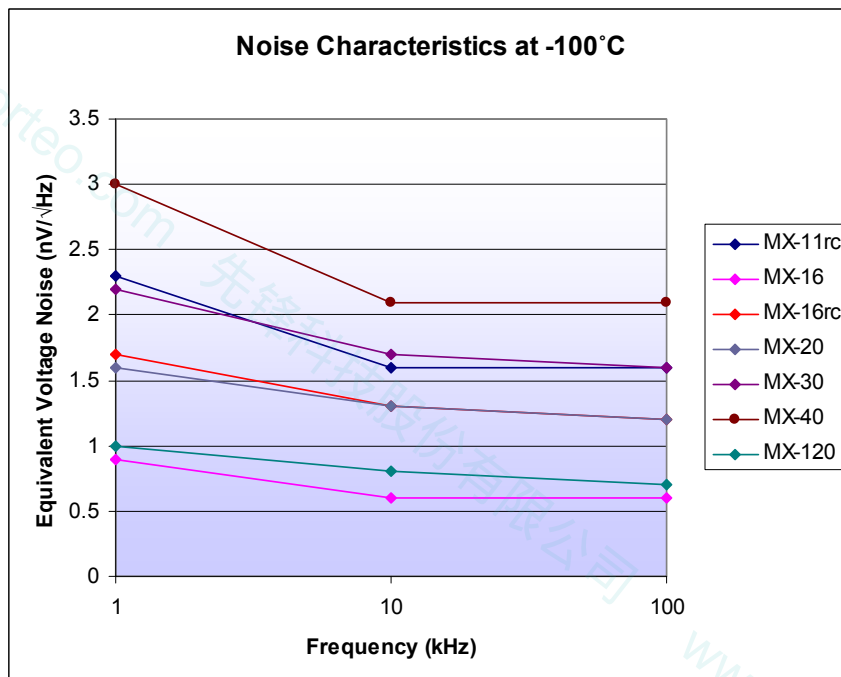
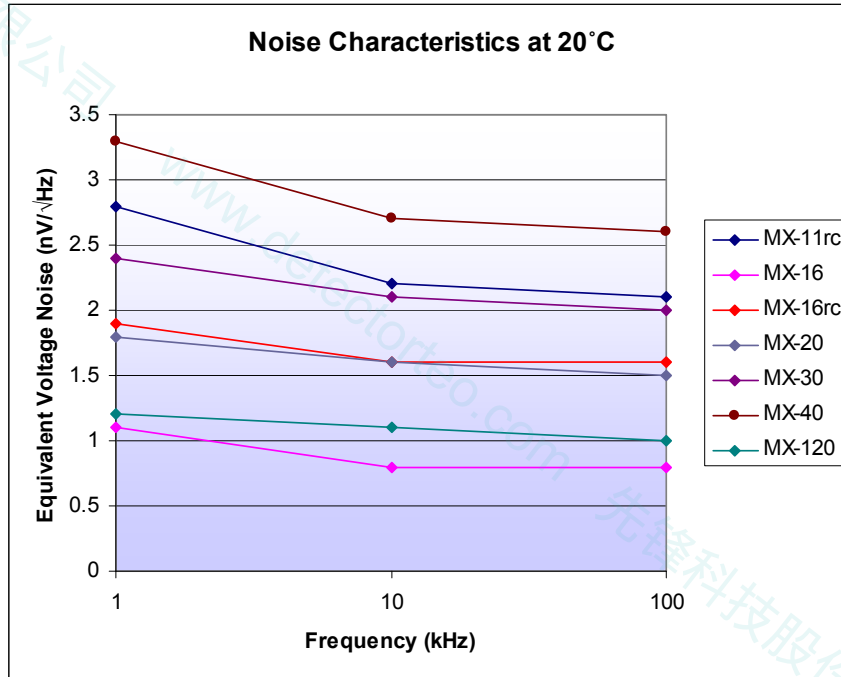


452 West 1260 North  
Orem, UT 84057  
P 801.225.0930  
F 801.221.1121

[www.moxtek.com](http://www.moxtek.com)

# N-Channel Ultra-low Noise JFETs Data Overview

## Noise Graphs



452 West 1260 North  
Orem, UT 84057  
P 801.225.0930  
F 801.221.1121

[www.moxtek.com](http://www.moxtek.com)