2N4416, 2N4416A N-Channel JFET

Features

- InterFET N0026S Geometry
- Low Noise: 4 nV/√Hz Typical
- Low Leakage: 10pA Typical
- RoHS Compliant
- SMT, TH, and Bare Die Package options.

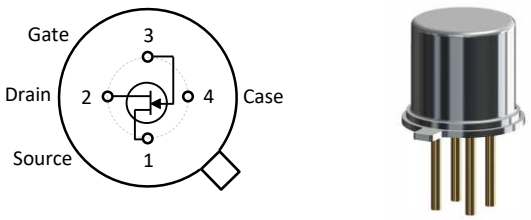
Applications

- Mixers
- VHF Amplifiers

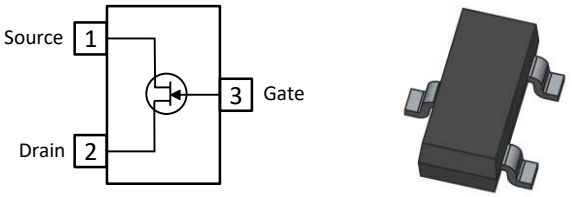
Description

The -30V InterFET 2N4416 and 2N4416A are targeted for sensitive mixer and VHF Amplifier amplifier designs. Gate leakages are typically less than 10pA at room temperatures. The “A” variant has a higher breakdown Voltage. The TO-72 package is hermetically sealed and suitable for military applications.

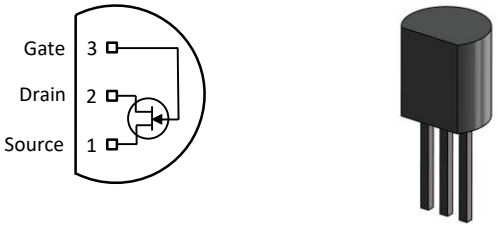
TO-72 Bottom View



SOT23 Top View



TO-92 Bottom View



Product Summary

Parameters		2N4416 Min	2N4416A Min	Unit
BV_{GSS}	Gate to Source Breakdown Voltage	-30	-35	V
I_{DSS}	Drain to Source Saturation Current	5	5	mA
$V_{GS(off)}$	Gate to Source Cutoff Voltage		-2.5	V
G_{FS}	Forward Transconductance	4500	4500	µS

Ordering Information Custom Part and Binning Options Available

Part Number	Description	Case	Packaging
2N4416; 2N4416A	Through-Hole	TO-72	Bulk
PN4416; PN4416A	Through-Hole	TO-92	Bulk
SMP4416; SMP4416A	Surface Mount	SOT23	Bulk
SMP4416TR; SMP4416ATR	7“ Tape and Reel: Max 3,000 Pieces 13” Tape and Reel: Max 9,000 Pieces	SOT23	Minimum 1,000 Pieces Tape and Reel
2N4416COT; 2N4416ACOT	Chip Orientated Tray (COT Waffle Pack)	COT	400/Waffle Pack
2N4416CFT; 2N4416ACFT	Chip Face-up Tray (CFT Waffle Pack)	CFT	400/Waffle Pack

Disclaimer: It is the Buyers responsibility for designing, validating and testing the end application under all field use cases and extreme use conditions. Guaranteeing the application meets required standards, regulatory compliance, and all safety and security requirements is the responsibility of the Buyer. These resources are subject to change without notice.

Electrical Characteristics

Maximum Ratings (@ T_A = 25°C, Unless otherwise specified, Highlighted values = A variant)

Parameters		Value	Unit
V_{RGS}	Reverse Gate Source and Gate Drain Voltage	-30 -35	V
I_{FG}	Continuous Forward Gate Current	10	mA
P_D	Continuous Device Power Dissipation	300	mW
P	Power Derating	2	mW/°C
T_J	Operating Junction Temperature	-55 to 125	°C
T_{STG}	Storage Temperature	-65 to 150	°C

Static Characteristics (@ TA = 25°C, Unless otherwise specified)

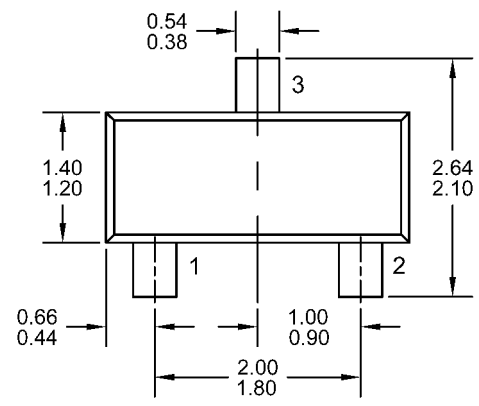
Parameters		Conditions	2N4416		2N4416A		Unit
			Min	Max	Min	Max	
$V_{(BR)GSS}$	Gate to Source Breakdown Voltage	V_{DS} = 0V, I_G = -1µA	-30		-35		V
I_{GSS}	Gate to Source Reverse Current	V_{GS} = -20V, V_{DS} = 0V, T_A = 25°C V_{GS} = -20V, V_{DS} = 0V, T_A = 150°C		-0.1 -0.1		-0.1 -0.1	nA µA
$V_{GS(OFF)}$	Gate to Source Cutoff Voltage	V_{DS} = 15V, I_D = 1nA		-6	-2.5	-6	V
I_{DSS}	Drain to Source Saturation Current	V_{GS} = 0V, V_{DS} = 15V (Pulsed)	5	15	5	15	mA

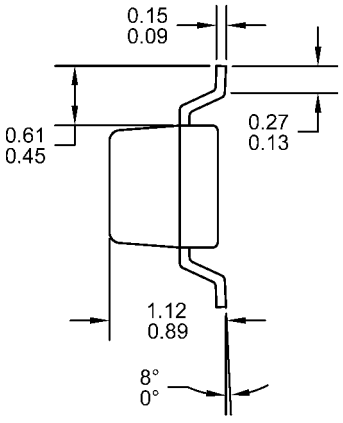
Dynamic Characteristics (@ TA = 25°C, Unless otherwise specified)

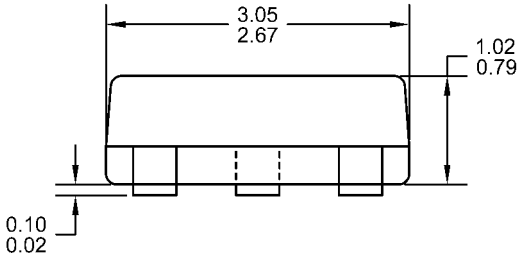
Parameters		Conditions	2N4416		2N4416A		Unit
			Min	Max	Min	Max	
G_{FS}	Forward Transconductance	V_{DS} = 15V, V_{GS} = 0V, f = 1kHz V_{DS} = 15V, V_{GS} = 0V, f = 400MHz	4500 4000	7500	4500 4000	7500	µS
G_{OS}	Output Conductance	V_{DS} = 15V, V_{GS} = 0V, f = 1kHz		50		50	µS
		V_{DS} = 15V, V_{GS} = 0V, f = 100MHz		75		75	
		V_{DS} = 15V, V_{GS} = 0V, f = 400MHz		100		100	
C_{iss}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		4		4	pF
C_{OSS}	Output Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		2		2	pF
C_{rss}	Reverse Transfer Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz		0.8		0.8	pF
G_{is}	Input Conductance	V_{DS} = 15V, V_{GS} = 0V, f = 100MHz V_{DS} = 15V, V_{GS} = 0V, f = 400MHz		100 1000		100 1000	µS
b_{is}	Input Susceptance	V_{DS} = 15V, V_{GS} = 0V, f = 100MHz V_{DS} = 15V, V_{GS} = 0V, f = 400MHz		2500 10000		2500 10000	µS
b_{os}	Output Susceptance	V_{DS} = 15V, V_{GS} = 0V, f = 100MHz V_{DS} = 15V, V_{GS} = 0V, f = 400MHz		1000 4000		1000 4000	µS
G_{ps}	Power Gain	V_{DS} = 15V, I_D = 5mA, f = 100MHz V_{DS} = 15V, I_D = 5mA, f = 400MHz	18 10		18 10		dB
NF	Noise Figure	V_{DS} = 15V, V_{GS} = 0V, f = 100MHz V_{DS} = 15V, V_{GS} = 0V, f = 400MHz R_G = 1 kΩ		2 4		2 4	dB

SOT23 (TO-236AB) Mechanical and Layout Data

Package Outline Data

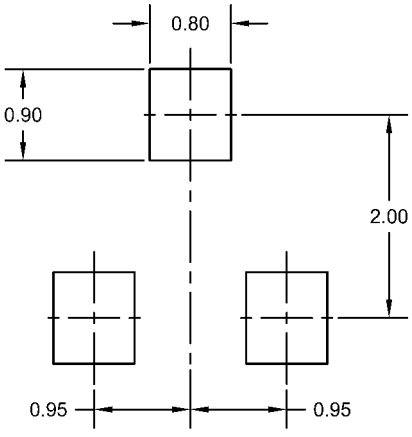






1. All linear dimensions are in millimeters.
2. Package weight approximately 0.12 grams
3. Molded plastic case UL 94V-0 rated
4. For Tape and Reel specifications refer to InterFET CTC-021 Tape and Reel Specification, Document number: IF39002
5. Bulk product is shipped in standard ESD shipping material
6. Refer to JEDEC standards for additional information.

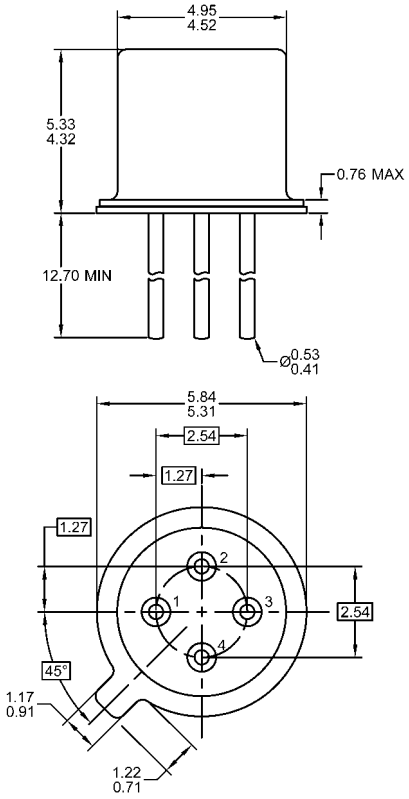
Suggested Pad Layout



1. All linear dimensions are in millimeters.
2. The suggested land pattern dimensions have been provided for reference only. A more robust pattern may be desired for wave soldering.

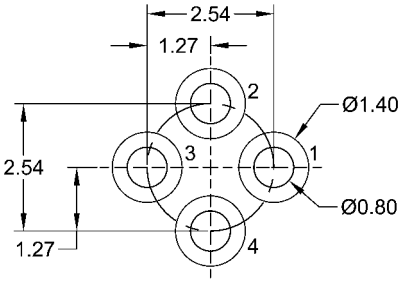
TO-72 Mechanical and Layout Data

Package Outline Data



1. All linear dimensions are in millimeters.
2. Four leaded device. Not all leads are shown in drawing views.
3. Package weight approximately 0.31 grams
4. Bulk product is shipped in standard ESD shipping material
5. Refer to JEDEC standards for additional information.

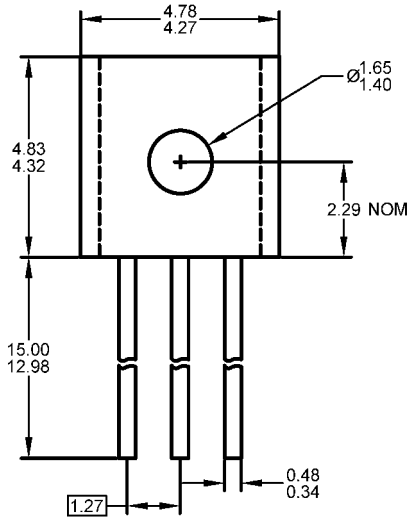
Suggested Through-Hole Layout

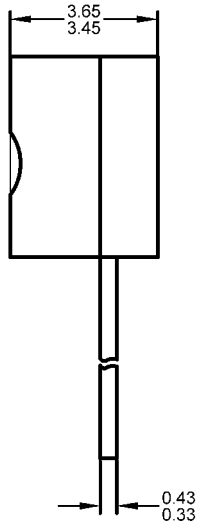


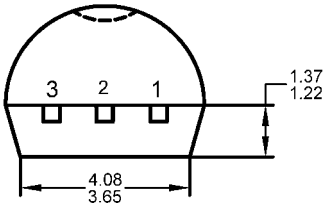
1. All linear dimensions are in millimeters.
2. The suggested land pattern dimensions have been provided as a straight lead reference only. A more robust pattern may be desired for wave soldering and/or bent lead configurations.

TO-92 Mechanical and Layout Data

Package Outline Data

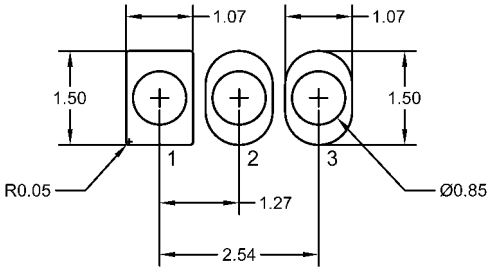






1. All linear dimensions are in millimeters.
2. Package weight approximately 0.19 grams
3. Molded plastic case UL 94V-0 rated
4. Bulk product is shipped in standard ESD shipping material
5. Refer to JEDEC standards for additional information.

Suggested Through-Hole Layout



1. All linear dimensions are in millimeters.
2. The suggested land pattern dimensions have been provided as a straight lead reference only. A more robust pattern may be desired for wave soldering and/or bent lead configurations.