

# 2N5638, 2N5639

2N5638 is a Preferred Device

## JFET Chopper Transistors

### N-Channel – Depletion

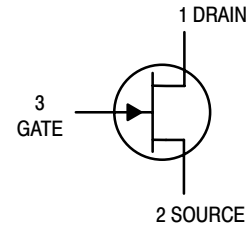
N-Channel Junction Field Effect Transistors, depletion mode (Type A) designed for chopper and high-speed switching applications.

- Low Drain-Source “ON” Resistance:  
 $R_{DS(on)} = 30\Omega$  for 2N5638  
 $R_{DS(on)} = 60\Omega$  for 2N5639
- Low Reverse Transfer Capacitance  
 $C_{RSS} = 4.0 \text{ pF (Max) @ } f = 1.0 \text{ MHz}$
- Fast Switching Characteristics  
 $t_r = 5.0 \text{ ns (Max) (2N5638)}$



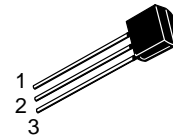
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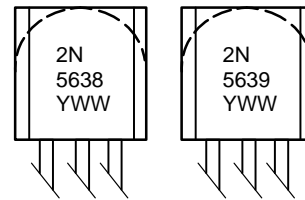
#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	Vdc
Drain-Gate Voltage	$V_{DG}$	30	Vdc
Reverse Gate-Source Voltage	$V_{GSR}$	30	Vdc
Forward Gate Current	$I_{GF}$	10	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	310 2.82	mW mW/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Operating Junction Temp Range	$T_J$	-65 to +135	$^\circ\text{C}$



TO-92  
CASE 29  
STYLE 5

#### MARKING DIAGRAMS



Y = Year  
WW = Work Week

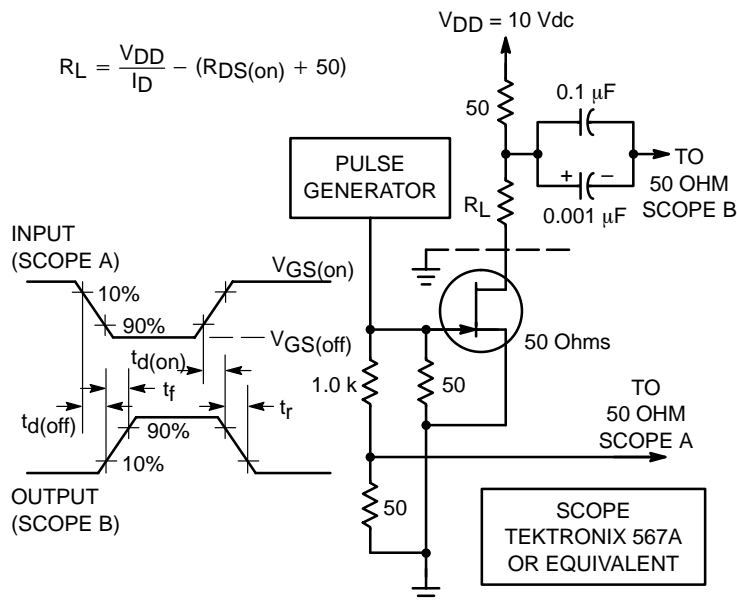


Figure 1. Switching Times Test Circuit

#### ORDERING INFORMATION

Device	Package	Shipping
2N5638RLRA	TO-92	2000/Tape & Reel
2N5639	TO-92	5000/Box
2N5369RLRA	TO-92	2000/Tape & Reel

Preferred devices are recommended choices for future use and best overall value.

## 2N5638, 2N5639

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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#### OFF CHARACTERISTICS

Gate–Source Breakdown Voltage (I <sub>G</sub> = –1.0 μAdc, V <sub>DS</sub> = 0)	V <sub>(BR)GSS</sub>	35	–	Vdc
Gate Reverse Current (V <sub>GS</sub> = –15 Vdc, V <sub>DS</sub> = 0) (V <sub>GS</sub> = –15 Vdc, V <sub>DS</sub> = 0, T <sub>A</sub> = 100°C)	I <sub>GSS</sub>	–	1.0 1.0	nAdc μAdc
Drain–Cutoff Current (V <sub>DS</sub> = 15 Vdc, V <sub>GS</sub> = –12 Vdc) (V <sub>DS</sub> = 15 Vdc, V <sub>GS</sub> = –12 Vdc, T <sub>A</sub> = 100°C) (V <sub>DS</sub> = 15 Vdc, V <sub>GS</sub> = –8.0 Vdc) (V <sub>DS</sub> = 15 Vdc, V <sub>GS</sub> = –8.0 Vdc, T <sub>A</sub> = 100°C)	I <sub>D(off)</sub>	–	1.0 1.0 1.0 1.0	μAdc

#### ON CHARACTERISTICS

Zero–Gate–Voltage Drain Current (Note 1.) (V <sub>DS</sub> = 20 Vdc, V <sub>GS</sub> = 0)	2N5638 2N5639	I <sub>DSS</sub>	50 25	– –	mAdc
Drain–Source “ON” Voltage (I <sub>D</sub> = 12 mAdc, V <sub>GS</sub> = 0) (I <sub>D</sub> = 6.0 mAdc, V <sub>GS</sub> = 0)	2N5638 2N5639	V <sub>DS(on)</sub>	– –	0.5 0.5	Vdc
Static Drain–Source “ON” Resistance (I <sub>D</sub> = 1.0 mAdc, V <sub>GS</sub> = 0)	2N5638 2N5639	R <sub>DS(on)</sub>	– –	30 60	Ω

#### SMALL–SIGNAL CHARACTERISTICS

Static Drain–Source “ON” Resistance (V <sub>GS</sub> = 0, I <sub>D</sub> = 0, f = 1.0 kHz)	2N5638 2N5639	R <sub>DS(on)</sub>	– –	30 60	Ω
Input Capacitance (V <sub>DS</sub> = 0, V <sub>GS</sub> = –12 Vdc, f = 1.0 MHz)		C <sub>iss</sub>	–	10	pF
Reverse Transfer Capacitance (V <sub>DS</sub> = 0, V <sub>GS</sub> = –12 Vdc, f = 1.0 MHz)		C <sub>rss</sub>	–	4.0	pF

#### SWITCHING CHARACTERISTICS (V<sub>DD</sub> = 10 Vdc, V<sub>GS(on)</sub> = 0, V<sub>GS(off)</sub> = –10 Vdc, R<sub>G'</sub> = 50 Ω. See Figure 1 on page 1)

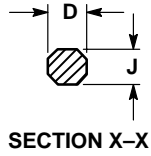
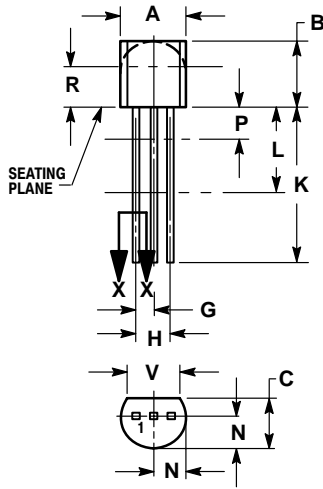
Turn–On Delay Time I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	t <sub>d(on)</sub>	– –	4.0 6.0	ns
Rise Time I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	t <sub>r</sub>	– –	5.0 8.0	ns
Turn–Off Delay Time I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	t <sub>d(off)</sub>	– –	5.0 10	ns
Fall Time I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	I <sub>D(on)</sub> = 12 mAdc, 2N5638 I <sub>D(on)</sub> = 6.0 mAdc, 2N5639	t <sub>f</sub>	– –	10 20	ns

1. Pulse Width ≤ 300 μs, Duty Cycle ≤ 3.0%.

# 2N5638, 2N5639

## PACKAGE DIMENSIONS


TO-92 (TO-226)  
CASE 29-11  
ISSUE AL



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

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