

# 2N5638, 2N5639

2N5638 is a Preferred Device

## JFET Chopper Transistors

### N-Channel – Depletion

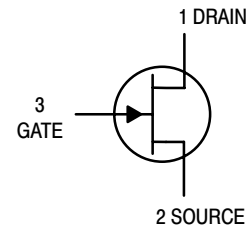
N-Channel Junction Field Effect Transistors, depletion mode (Type A) designed for chopper and high-speed switching applications.

- 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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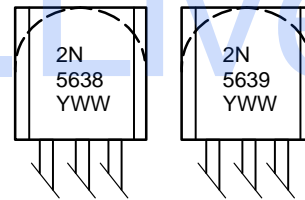
#### MAXIMUM RATINGS

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

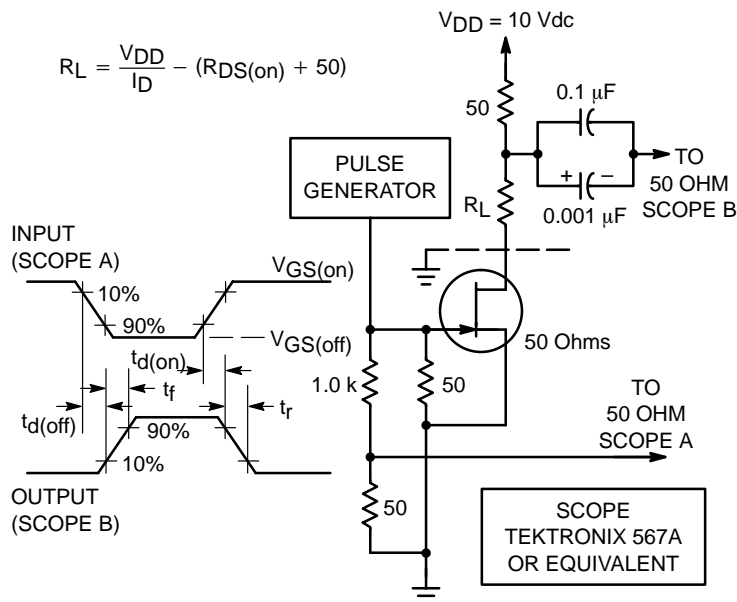


Figure 1. Switching Times Test Circuit

#### 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 ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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#### OFF CHARACTERISTICS

Gate–Source Breakdown Voltage ( $I_G = -1.0 \mu\text{Adc}$ , $V_{DS} = 0$ )	$V_{(BR)GSS}$	35	–	Vdc
Gate Reverse Current ( $V_{GS} = -15 \text{ Vdc}$ , $V_{DS} = 0$ ) ( $V_{GS} = -15 \text{ Vdc}$ , $V_{DS} = 0$ , $T_A = 100^\circ\text{C}$ )	$I_{GSS}$	–	1.0 1.0	nAdc $\mu\text{Adc}$
Drain–Cutoff Current ( $V_{DS} = 15 \text{ Vdc}$ , $V_{GS} = -12 \text{ Vdc}$ ) ( $V_{DS} = 15 \text{ Vdc}$ , $V_{GS} = -12 \text{ Vdc}$ , $T_A = 100^\circ\text{C}$ ) ( $V_{DS} = 15 \text{ Vdc}$ , $V_{GS} = -8.0 \text{ Vdc}$ ) ( $V_{DS} = 15 \text{ Vdc}$ , $V_{GS} = -8.0 \text{ Vdc}$ , $T_A = 100^\circ\text{C}$ )	$I_{D(off)}$	–	1.0 1.0 1.0 1.0	$\mu\text{Adc}$
	2N5638			
	2N5638			
	2N5639			
	2N5639			

#### ON CHARACTERISTICS

Zero–Gate–Voltage Drain Current (Note 1.) ( $V_{DS} = 20 \text{ Vdc}$ , $V_{GS} = 0$ )	2N5638 2N5639	$I_{DSS}$	50 25	– –	mAdc
Drain–Source “ON” Voltage ( $I_D = 12 \text{ mAdc}$ , $V_{GS} = 0$ ) ( $I_D = 6.0 \text{ mAdc}$ , $V_{GS} = 0$ )	2N5638 2N5639	$V_{DS(on)}$	– –	0.5 0.5	Vdc
Static Drain–Source “ON” Resistance ( $I_D = 1.0 \text{ mAdc}$ , $V_{GS} = 0$ )	2N5638 2N5639	$R_{DS(on)}$	– –	30 60	$\Omega$

#### SMALL–SIGNAL CHARACTERISTICS

Static Drain–Source “ON” Resistance ( $V_{GS} = 0$ , $I_D = 0$ , $f = 1.0 \text{ kHz}$ )	2N5638 2N5639	$R_{DS(on)}$	– –	30 60	$\Omega$
Input Capacitance ( $V_{DS} = 0$ , $V_{GS} = -12 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ )		$C_{iss}$	–	10	pF
Reverse Transfer Capacitance ( $V_{DS} = 0$ , $V_{GS} = -12 \text{ Vdc}$ , $f = 1.0 \text{ MHz}$ )		$C_{rss}$	–	4.0	pF

#### SWITCHING CHARACTERISTICS ( $V_{DD} = 10 \text{ Vdc}$ , $V_{GS(on)} = 0$ , $V_{GS(off)} = -10 \text{ Vdc}$ , $R_G = 50 \Omega$ . See Figure 1 on page 1)

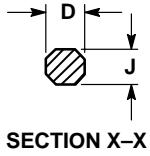
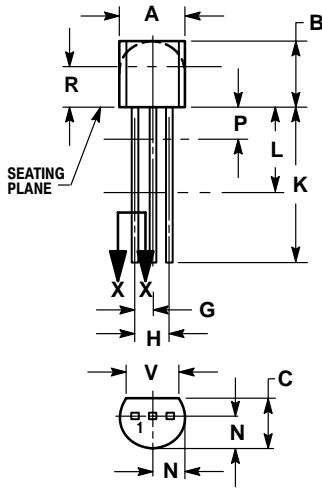
Turn–On Delay Time $I_{D(on)} = 12 \text{ mAdc}$ , 2N5638 $I_{D(on)} = 6.0 \text{ mAdc}$ , 2N5639	$t_{d(on)}$	– –	4.0 6.0	ns
Rise Time $I_{D(on)} = 12 \text{ mAdc}$ , 2N5638 $I_{D(on)} = 6.0 \text{ mAdc}$ , 2N5639	$t_r$	– –	5.0 8.0	ns
Turn–Off Delay Time $I_{D(on)} = 12 \text{ mAdc}$ , 2N5638 $I_{D(on)} = 6.0 \text{ mAdc}$ , 2N5639	$t_{d(off)}$	– –	5.0 10	ns
Fall Time $I_{D(on)} = 12 \text{ mAdc}$ , 2N5638 $I_{D(on)} = 6.0 \text{ mAdc}$ , 2N5639	$t_f$	– –	10 20	ns

1. Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 3.0\%$ .

# 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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