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.

Features
- Low Drain–Source "ON" Resistance: RDS(on) = 30Ω for 2N5638
  RDS(on) = 60Ω for 2N5639
- Low Reverse Transfer Capacitance –
  C_{rss} = 4.0 pF (Max) @ f = 1.0 MHz
- Fast Switching Characteristics – t_r = 5.0 ns (Max) (2N5638)
- Pb–Free Packages are Available*

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°C Derate above 25°C	P_D	310 2.82	mW mW/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temp Range	T_J	−65 to +135	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.
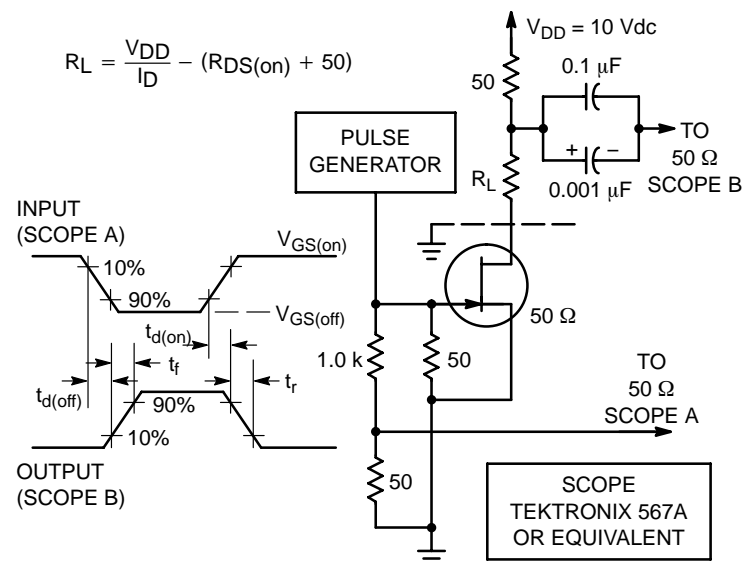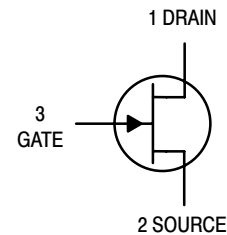
$$R_L = \frac{V_{DD}}{I_D} - (R_{DS(on)} + 50)$$

Figure 1. Switching Times Test Circuit

*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.
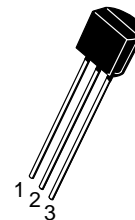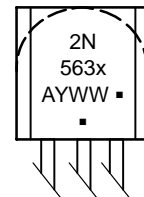
1 DRAIN

3 GATE

2 SOURCE

MARKING DIAGRAM

TO–92 CASE 29 STYLE 5

2N 563x AYWW ▪

x = 8 or 9
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb–Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping[†]
2N5638RLRA	TO–92	2000/Tape & Reel
2N5638RLRAG	TO–92 (Pb–Free)	2000/Tape & Reel
2N5639	TO–92	1000 Units/Box
2N5639G	TO–92 (Pb–Free)	1000 Units/Box
2N5369RLRA	TO–92	2000/Tape & Reel
2N5369RLRAG	TO–92 (Pb–Free)	2000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

**ELECTRICAL CHARACTERISTICS** (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Gate–Source Breakdown Voltage (I_G = –1.0 μAdc, V_{DS} = 0)		$V_{(BR)GSS}$	35	–	Vdc
Gate Reverse Current (V_{GS} = –15 Vdc, V_{DS} = 0) (V_{GS} = –15 Vdc, V_{DS} = 0, T_A = 100°C)		I_{GSS}	–	1.0 1.0	nAdc μAdc
Drain–Cutoff Current (V_{DS} = 15 Vdc, V_{GS} = –12 Vdc) 2N5638 (V_{DS} = 15 Vdc, V_{GS} = –12 Vdc, T_A = 100°C) 2N5638 (V_{DS} = 15 Vdc, V_{GS} = –8.0 Vdc) 2N5639 (V_{DS} = 15 Vdc, V_{GS} = –8.0 Vdc, T_A = 100°C) 2N5639		$I_{D(off)}$	–	1.0 1.0 1.0 1.0	μAdc
ON CHARACTERISTICS					
Zero–Gate–Voltage Drain Current (Note 1) 2N5638 (V_{DS} = 20 Vdc, V_{GS} = 0) 2N5639		I_{DSS}	50 25	– –	mAdc
Drain–Source "ON" Voltage (I_D = 12 mAdc, V_{GS} = 0) 2N5638 (I_D = 6.0 mAdc, V_{GS} = 0) 2N5639		$V_{DS(on)}$	– –	0.5 0.5	Vdc
Static Drain–Source "ON" Resistance (I_D = 1.0 mAdc, V_{GS} = 0) 2N5638 2N5639		$R_{DS(on)}$	– –	30 60	Ω
SMALL–SIGNAL CHARACTERISTICS					
Static Drain–Source "ON" Resistance (V_{GS} = 0, I_D = 0, f = 1.0 kHz) 2N5638 2N5639		$R_{DS(on)}$	– –	30 60	Ω
Input Capacitance (V_{DS} = 0, V_{GS} = –12 Vdc, f = 1.0 MHz)		C_{iss}	–	10	pF
Reverse Transfer Capacitance (V_{DS} = 0, V_{GS} = –12 Vdc, f = 1.0 MHz)		C_{rss}	–	4.0	pF

SWITCHING CHARACTERISTICS (V_{DD} = 10 Vdc, $V_{GS(on)}$ = 0, $V_{GS(off)}$ = –10 Vdc, $R_{G'}$ = 50 Ω. See Figure 1 on page 1)

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

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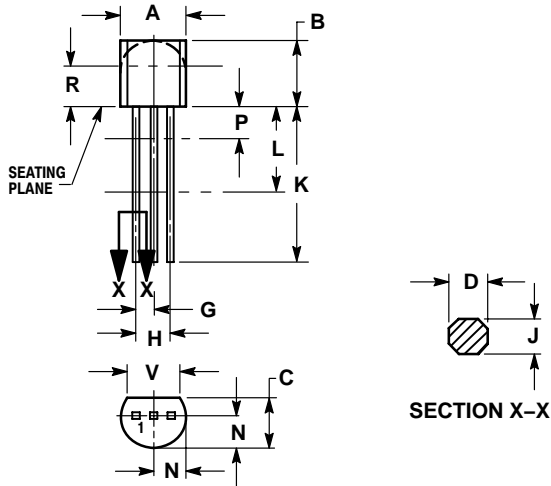
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

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	---

STYLE 5:
PIN 1. DRAIN
2. SOURCE
3. GATE