



MOTOROLA

2N5638, 2N5639, 2N5640
N-Channel Junction Field-Effect Transistors

2N5638
2N5639
2N5640

N-CHANNEL JUNCTION FIELD-EFFECT TRANSISTORS

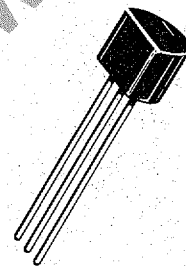
... depletion mode (Type A) Junction Field-Effect Transistors designed for chopper and high-speed switching applications.

- Low Drain-Source "ON" Resistance —
 $r_{ds(on)} = 30 \text{ Ohms (2N5638)}$
 60 Ohms (2N5639)
 $100 \text{ Ohms (2N5640)}$
- Low Reverse Transfer Capacitance —
 $C_{rss} = 4.0 \text{ pF (Max) @ } f = 1.0 \text{ MHz}$
- Fast Switching Characteristics —
 $t_r = 5.0 \text{ ns (Max) (2N5638)}$

N-CHANNEL JUNCTION FIELD-EFFECT TRANSISTORS

TYPE A

JUNE 1969 — DS 5319

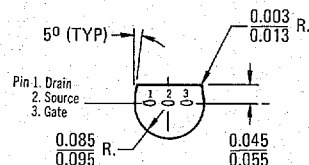
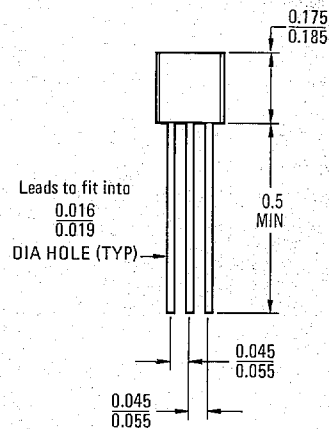
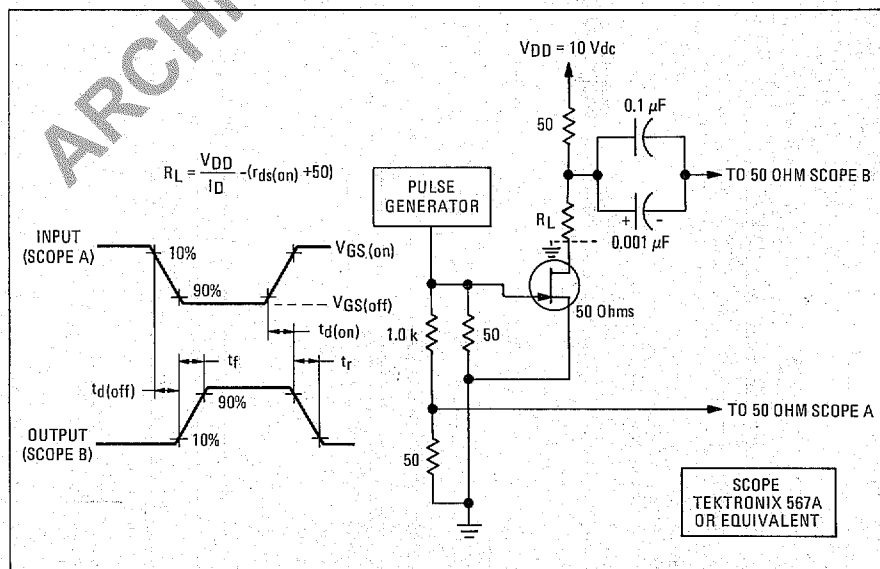


MAXIMUM RATINGS

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	mA dc
*Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	310 2.82	mW mW/ $^\circ\text{C}$
*Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-65 to +135	$^\circ\text{C}$

*Indicates JEDEC Registered Data

FIGURE 1 — SWITCHING TIMES TEST CIRCUIT



Case 29 (5)
(TO-92)

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Gate-Source Breakdown Voltage ($I_G = 10 \mu\text{Adc}$, $V_{DS} = 0$)	$V_{(BR)GSS}$	30	—	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 μAdc
Drain Cutoff Current ($V_{DS} = 15 \text{ Vdc}$, $V_{GS} = -12 \text{ Vdc}$) ($V_{DS} = 15 \text{ Vdc}$, $V_{GS} = -8.0 \text{ Vdc}$) ($V_{DS} = 15 \text{ Vdc}$, $V_{GS} = -6.0 \text{ Vdc}$) ($V_{DS} = 15 \text{ Vdc}$, $V_{GS} = -12 \text{ Vdc}$, $T_A = 100^\circ\text{C}$) ($V_{DS} = 15 \text{ Vdc}$, $V_{GS} = -8.0 \text{ Vdc}$, $T_A = 100^\circ\text{C}$) ($V_{DS} = 15 \text{ Vdc}$, $V_{GS} = -6.0 \text{ Vdc}$, $T_A = 100^\circ\text{C}$)	$I_{D(off)}$	— — — — — —	1.0 1.0 1.0 1.0 1.0 1.0	μAdc μAdc

ON CHARACTERISTICS

Zero-Gate Voltage Drain Current (Note 1) ($V_{DS} = 20 \text{ Vdc}$, $V_{GS} = 0$)	I_{DSS}	50 25 5.0	— — —	mAdc
Drain-Source "ON" Voltage ($I_D = 12 \text{ mAdc}$, $V_{GS} = 0$) ($I_D = 6.0 \text{ mAdc}$, $V_{GS} = 0$) ($I_D = 3.0 \text{ mAdc}$, $V_{GS} = 0$)	$V_{DS(on)}$	— — —	0.5 0.5 0.5	Vdc
Static Drain-Source "ON" Resistance ($I_D = 1.0 \text{ mAdc}$, $V_{GS} = 0$)	$r_{DS(on)}$	— — —	30 60 100	Ohms

SMALL-SIGNAL CHARACTERISTICS

Static Drain-Source "ON" Resistance ($V_{GS} = 0$, $I_D = 0$, $f = 1.0 \text{ kHz}$)	$r_{ds(on)}$	— — —	30 60 100	Ohms
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 (Figure 1)

Turn-On Delay Time	$V_{DD} = 10 \text{ Vdc}$, $V_{GS(on)} = 0$, $V_{GS(off)} = -10 \text{ Vdc}$, $R_G = 50 \text{ ohms}$	$I_{D(on)} = 12 \text{ mAdc}$ 2N5638 6.0 mAdc 2N5639 3.0 mAdc 2N5640	$t_{d(on)}$	— — —	4.0 6.0 8.0	ns
Rise Time		$I_{D(on)} = 12 \text{ mAdc}$ 2N5638 6.0 mAdc 2N5639 3.0 mAdc 2N5640	t_r	— — —	5.0 8.0 10	ns
Turn-Off Delay Time		$I_{D(on)} = 12 \text{ mAdc}$ 2N5638 6.0 mAdc 2N5639 3.0 mAdc 2N5640	$t_{d(off)}$	— — —	5.0 10 15	ns
Fall Time		$I_{D(on)} = 12 \text{ mAdc}$ 2N5638 6.0 mAdc 2N5639 3.0 mAdc 2N5640	t_f	— — —	10 20 30	ns

* Indicates JEDEC Registered Data.

Note 1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 3.0\%$.**MOTOROLA Semiconductor Products Inc.**

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