

N-CHANNEL ENHANCEMENT-MODE D-MOS FET ULTRA HIGH-SPEED LOW-COST SWITCH

FEATURES

- Reliable, low cost, plastic package
- High Speed Switching, $t_r < 1\text{nSec}$
- Low Capacitance, C_{rss} 0.3 pF typ
- CMOS and TTL Compatible Input

APPLICATIONS

- Switch Drivers
- Video Switches
- Sample and Hold and Track and Hold
- VHF/UHF Amplifiers

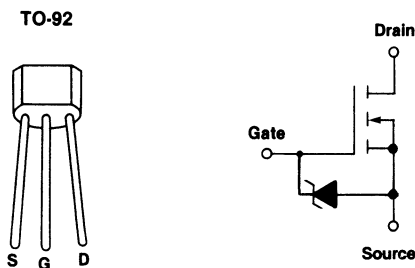
ABSOLUTE MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Drain-Source Voltage	+15V	Continuous Drain Current	50mA
Gate-Source Voltage	-0.3V	Power Dissipation (at or below $T_A = +25^\circ\text{C}$)	300mW
	+20V	Linear Derating Factor	3.0mW/ $^\circ\text{C}$
Gate-Drain Voltage	-0.3V	Operating Storage and	
	+20V	Junction Temperature Range	-40 $^\circ\text{C}$ to +125 $^\circ\text{C}$
Source-Drain Voltage	-0.3V		

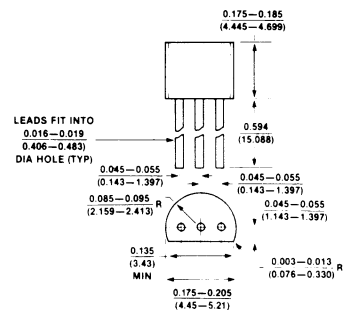
ORDERING INFORMATION

TO-92 Plastic Package	TZ402BD
Description	15V, 60 ohm

PIN CONFIGURATION/SCHEMATIC DIAGRAM



PACKAGE DIMENSIONS TO-92

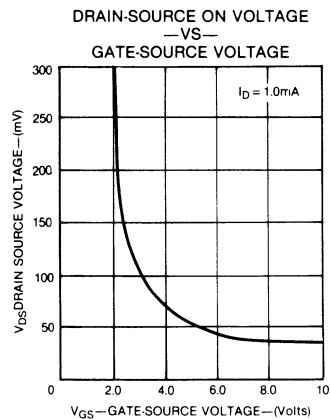
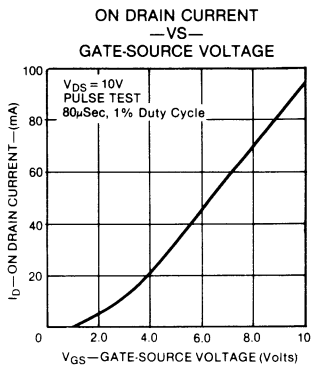


All dimensions in inches and (millimeters)

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$)

CHARACTERISTIC		MIN	TYP	MAX	UNIT	TEST CONDITION
STATIC	BV _{DS} Drain-Source Breakdown Voltage	15	25		V	I _D = 1.0μA, V _{GS} = 0
	I _{D(off)} Drain-Source OFF Leakage Current			1.0	μA	V _{DS} = 15V, V _{GS} = 0
	I _{GSS} Gate-Source Leakage Current			1.0	μA	V _{GS} = 20V, V _{DS} = 0
	I _{D(on)} Drain-Source ON Current	50	100		mA	V _{DS} = 10V, V _{GS} = 10V Pulse Test
	V _{GS(th)} Gate-Source Threshold Voltage	0.7		1.5	V	I _D = 1.0μA, V _{DS} = V _{GS}
	V _{DS(on)} Drain-Source ON Voltage		150	250	mV	I _D = 1mA, V _{GS} = 2.4V
	r _{DS(on)} Drain-Source ON Resistance		150	250	ohms	
	V _{DS(on)} Drain-Source ON Voltage		60	80	mV	I _D = 1mA, V _{GS} = 4.5V
	r _{DS(on)} Drain-Source ON Resistance		60	80	ohms	
	g _{fs} Common-Source Forward Transcond.	8.0	12		mmhos	I _D = 20mA V _{DS} = 10V f = 1KHz Pulse Test
DYNAMIC	c _{iss} Common-Source Input Capacitance		4.0	5.0		V _{DS} = 10V, V _{GS} = 0 f = 1MHz
	c _{oss} Common-Source Output Capacitance		1.8	2.5	pf	
	c _{rss} Common-Source Reverse Transfer Capacitance		0.3	0.5		
	t _{d(on)} Turn ON Delay Time		0.7	1.0		
	t _r Rise Time		0.8	1.0	nS	
	t _(off) Turn OFF Time		12			

TYPICAL PERFORMANCE CHARACTERISTICS ($T_A = +25^\circ\text{C}$ unless otherwise noted)



N-CHANNEL ENHANCEMENT-MODE D-MOS FET ULTRA HIGH-SPEED LOW-COST SWITCH

ORDERING INFORMATION

TO-92 Plastic Package	TZ403BD
Description	15V, 60 ohm

FEATURES

- Reliable, Low Cost, Plastic Package
- High Speed Switching, $t_r < 1\text{nSec}$
- Low Capacitance, c_{rss} 0.4pF typ
- CMOS and TTL Compatible Input

APPLICATIONS

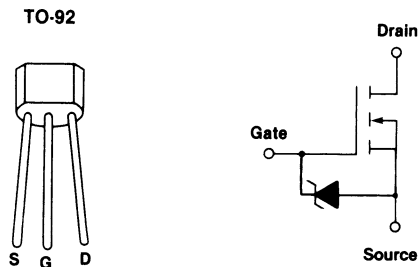
- Switch Drivers
- Video Switches
- Sample Hold and Track and Hold
- VHF/UHF Amplifiers

ABSOLUTE MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$ unless otherwise specified)

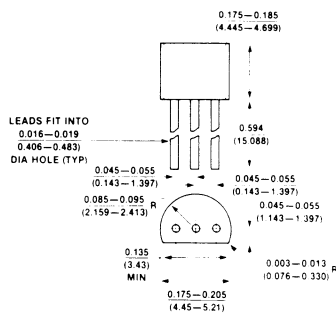
Drain-Source Voltage	+15V
Gate-Source Voltage	-0.3V
	+20V
Gate-Drain Voltage	-0.3V
	+20V
Source-Drain Voltage	-0.3V

Continuous Drain Current	50mA
Power Dissipation (at or below $T_A = +25^\circ\text{C}$)	300mW
Linear Derating Factor	3.0mW/ $^\circ\text{C}$
Operating Storage and Junction Temperature Range	-40°C to $+125^\circ\text{C}$

PIN CONFIGURATION/SCHEMATIC DIAGRAM



PACKAGE DIMENSIONS TO-92

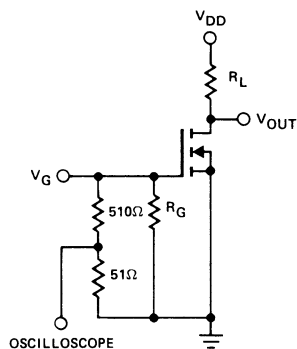


All dimensions in inches and (millimeters)

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

CHARACTERISTIC		MIN	TYP	MAX	UNIT	TEST CONDITION
STATIC	BV_{DS} Drain-Source Breakdown Voltage	15	25		V	$I_D = 1.0\mu\text{A}$, $V_{GS} = 0$
	$I_{D(off)}$ Drain-Source OFF Leakage Current			1.0	μA	$V_{DS} = 15\text{V}$, $V_{GS} = 0$
	I_{GSS} Gate-Source Leakage Current			1.0	μA	$V_{GS} = 20\text{V}$, $V_{DS} = 0$
	$I_{D(on)}$ Drain-Source ON Current	80	120		mA	$V_{DS} = 10\text{V}$, $V_{GS} = 10\text{V}$ Pulse Test
	$V_{GS(th)}$ Gate-Source Threshold Voltage	0.7		1.5	V	$I_D = 1.0\mu\text{A}$, $V_{DS} = V_{GS}$
	$V_{DS(on)}$ Drain-Source ON Voltage		140	175	mV	$I_D = 1\text{mA}$, $V_{GS} = 2.4\text{V}$
	$r_{DS(on)}$ Drain-Source ON Resistance		140	175	ohms	
	$V_{DS(on)}$ Drain-Source ON Voltage		40	60	mV	$I_D = 1\text{mA}$, $V_{GS} = 4.5\text{V}$
	$r_{DS(on)}$ Drain-Source ON Resistance		40	60	ohms	
DYNAMIC	g_{fs} Common-Source Forward Transcond.	15	19		mmhos	$I_D = 20\text{mA}$ $V_{DS} = 10\text{V}$ $f = 1\text{KHz}$ Pulse Test
	c_{iss} Common-Source Input Capacitance		4.5	6.0	pf	$V_{DS} = 10\text{V}$, $V_{GS} = 0$ $f = 1\text{MHz}$
	c_{oss} Common-Source Output Capacitance		2.0	3.0		
	c_{rss} Common-Source Reverse Transfer Capacitance		0.4	0.6		
	$t_{d(on)}$ Turn ON Delay Time		0.8	1.2	nS	$V_{DD} = 10\text{V}$, $R_L = 680\Omega$ $V_{G(on)} = 10\text{V}$, $R_G = 51\Omega$ $C_L = 1.5\text{pF}$
	t_r Rise Time		0.9	1.2		
	$t_{(off)}$ Turn OFF Time		14			

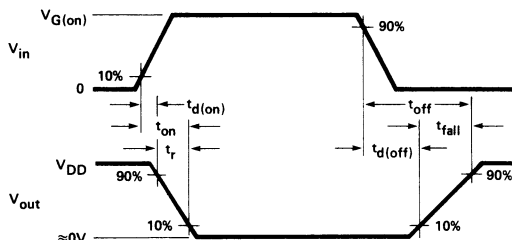
SWITCHING TIMES TEST CIRCUIT



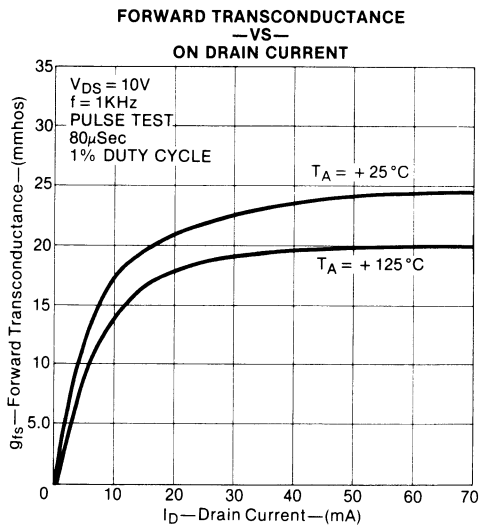
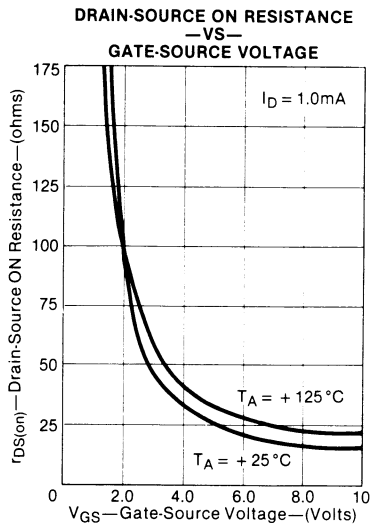
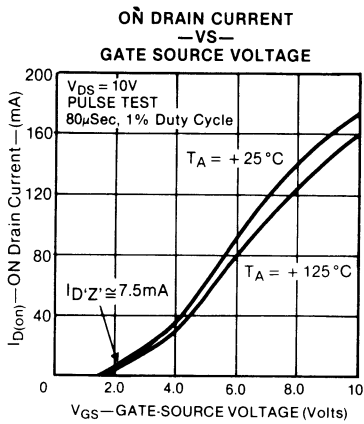
INPUT PULSE
 $t_r \leq 0.5 \text{ nSEC}$
 PULSE WIDTH – 100 nSEC

SAMPLING OSCILLOSCOPE
 $t_r < 0.36 \text{ nSEC}$
 $R_{in} > 1\text{M}\Omega$
 $C_{in} < 2.0 \text{ pF}$

TEST WAVEFORMS



TYPICAL PERFORMANCE CHARACTERISTICS ($T_A = +25^\circ\text{C}$ unless otherwise specified)



N-CHANNEL ENHANCEMENT-MODE D-MOS FET ULTRA HIGH-SPEED LOW-COST SWITCH

ORDERING INFORMATION

TO-92 Plastic Package	TZ4O4BD
Description	20V, 20 Ohm

FEATURES

- Reliable, Low Cost, Plastic Package
- High Speed Switching, $t_r < 2\text{nSec}$
- Low Capacitance, c_{rss} 1.2 pF typ
- CMOS and TTL Compatible Input

APPLICATIONS

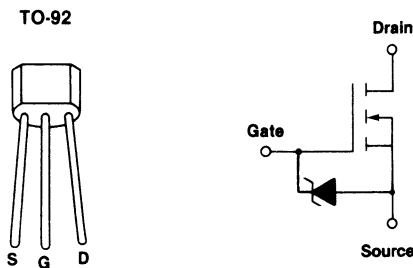
- Switch Drivers
- Video Switches
- Sample Hold and Track and Hold
- VHF/UHF Amplifiers

ABSOLUTE MAXIMUM RATINGS ($T_A = +25^\circ\text{C}$ unless otherwise specified)

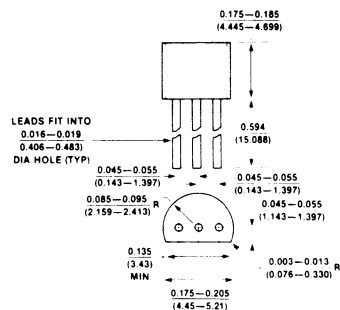
Drain-Source Voltage	+20V
Gate-Source Voltage	-0.3V
	+20V
Gate-Drain Voltage	-0.3V
	+20V
Source-Drain Voltage	-0.3V

Peak Pulsed Drain Current	+0.8A
Continuous Drain Current	140mA
Power Dissipation (at or below $T_A = +25^\circ\text{C}$)	300mW
Linear Derating Factor	3.0mW/ $^\circ\text{C}$
Operating Storage and Junction Temperature Range	-40 $^\circ\text{C}$ to +125 $^\circ\text{C}$

PIN CONFIGURATION/SCHEMATIC DIAGRAM



PACKAGE DIMENSIONS TO-92



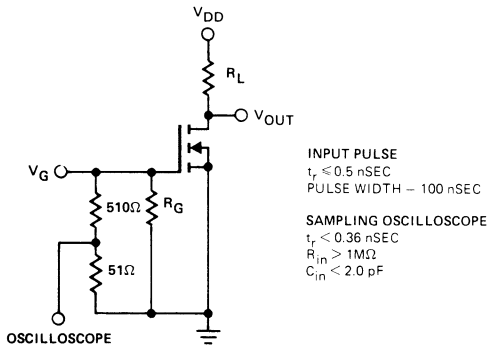
All dimensions in inches and (millimeters)

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

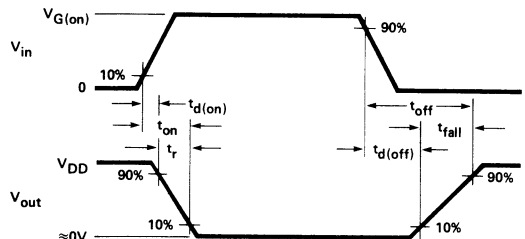
CHARACTERISTIC		MIN	TYP	MAX	UNIT	TEST CONDITION		
STATIC	BV_{DS} Drain-Source Breakdown Voltage	20	25		V	$I_D = 1.0\mu\text{A}$, $V_{GS} = 0$		
	$I_{D(off)}$ Drain-Source OFF Leakage Current			1.0	μA	$V_{DS} = 15\text{V}$, $V_{GS} = 0$		
	I_{GSS} Gate-Source Leakage Current			10	μA	$V_{GS} = 20\text{V}$, $V_{DS} = 0$		
	$I_{D(on)}$ Drain-Source ON Current	0.8	1.2		A	$V_{DS} = 10\text{V}$, $V_{GS} = 10\text{V}$ (Note 1)		
	$V_{GS(th)}$ Gate-Source Threshold Voltage	0.7	1.1	1.5	V	$I_D = 1.0\mu\text{A}$, $V_{DS} = V_{GS}$		
	$V_{DS(on)}$ Drain-Source ON Voltage			200	mV	$I_D = 10\text{mA}$ $V_{GS} = 2.4\text{V}$	(Note 1)	
	$r_{DS(on)}$ Drain-Source ON Resistance			20	ohms			
	$V_{DS(on)}$ Drain-Source ON Voltage			800	mV	$I_D = 100\text{mA}$ $V_{GS} = 4.5\text{V}$		
	$r_{DS(on)}$ Drain-Source ON Resistance			8.0	ohms			
DYNAMIC	g_{fs} Common-Source Forward Transcond.	100			mmhos	$I_D = 0.3\text{A}$ $V_{DS} = 20\text{V}$ $f = 1\text{KHz}$		
	C_{iss} Common-Source Input Capacitance		12	18	pf	$V_{DS} = 20\text{V}$, $V_{GS} = 0$ $f = 1\text{MHz}$		
	C_{oss} Common-Source Output Capacitance		6.0	8.0				
	C_{rss} Common-Source Reverse Transfer Capacitance		1.2	2.0				
	$t_{d(on)}$ Turn ON Delay Time		1.0	1.5	nS	$V_{DD} = 10\text{V}$, $R_L = 390\Omega$ $V_{G(on)} = 10\text{V}$, $R_G = 51\Omega$ $C_L = 1.5\text{pF}$		
	t_r Rise Time		1.0	2.0				
$t_{(off)}$ Turn OFF Time		1.0						

Note 1: Pulse Test, 80 μSec , 1% Duty Cycle

SWITCHING TIMES TEST CIRCUIT

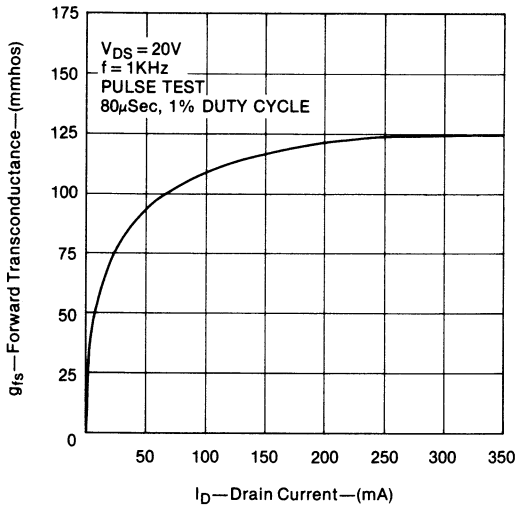


TEST WAVEFORMS

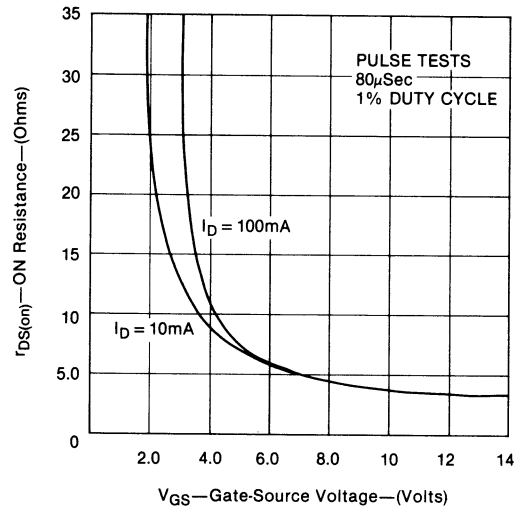


TYPICAL PERFORMANCE CHARACTERISTICS ($T_A = +25^\circ\text{C}$ unless otherwise specified)

FORWARD TRANSCONDUCTANCE
—VS—
ON DRAIN CURRENT



DRAIN-SOURCE ON RESISTANCE
—VS—
GATE-SOURCE VOLTAGE



ON DRAIN CURRENT
—VS—
GATE-SOURCE VOLTAGE

