



N-Channel JFETs

2N4391	PN4391	SST4391
2N4392	PN4392	SST4392
2N4393	PN4393	SST4393

PRODUCT SUMMARY

Part Number	$V_{GS(off)}$ (V)	$r_{DS(on)}$ Max (Ω)	$I_{D(off)}$ Typ (pA)	t_{ON} Typ (ns)
2N/PN/SST4391	-4 to -10	30	5	4
2N/PN/SST4392	-2 to -5	60	5	4
2N/PN/SST4393	-0.5 to -3	100	5	4

FEATURES

- Low On-Resistance: 4391 < 30 Ω
- Fast Switching— t_{ON} : 4 ns
- High Off-Isolation: $I_{D(off)}$ with Low Leakage
- Low Capacitance: < 3.5 pF
- Low Insertion Loss

BENEFITS

- Low Error Voltage
- High-Speed Analog Circuit Performance
- Negligible "Off-Error," Excellent Accuracy
- Good Frequency Response, Low Glitches
- Eliminates Additional Buffering

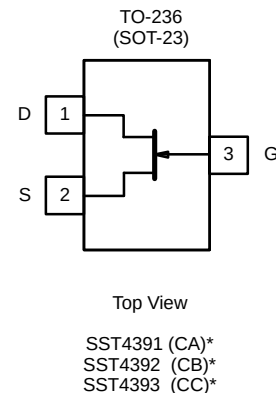
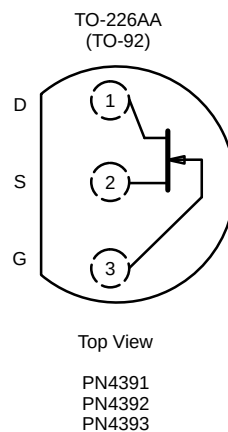
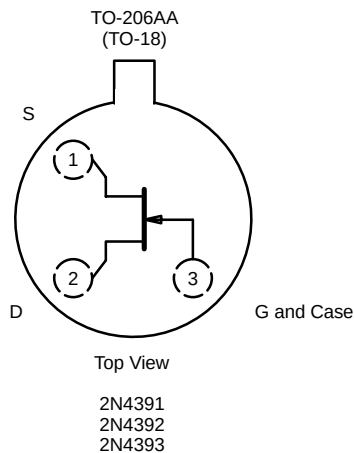
APPLICATIONS

- Analog Switches
- Choppers
- Sample-and-Hold
- Normally "On" Switches
- Current Limiters
- Commutators

DESCRIPTION

The 2N/PN/SST4391 series features many of the superior characteristics of JFETs which make it a good choice for demanding analog switching applications and for specialized amplifier circuits.

The 2N series hermetically-sealed TO-206AA (TO-18) can be available with processing per MIL-S-19500 (see Military Information). Both the PN, TO-226AA (TO-92), and SST, TO-236 (SOT-23), series are available in tape-and-reel for automated assembly (see Packaging Information). For similar dual products, see the 2N5564/5565/5566 data sheet.



*Marking Code for TO-236

For applications information see AN104 and AN106

ABSOLUTE MAXIMUM RATINGS

Gate-Drain, Gate-Source Voltage:

(2N/PN Prefixes) -40 V
(SST Prefix) -35 V

Gate Current 50 mA

Lead Temperature 300 °C

Storage Temperature : (2N Prefix) -65 to 200 °C
(PN/SST Prefixes) -55 to 150 °C

Operating Junction Temperature :

(2N Prefix) -55 to 200 °C
(PN/SST Prefixes) -55 to 150 °C

Power Dissipation :

(2N Prefix)^a (T_C = 25 °C) 1800 mW
(PN/SST Prefixes)^b 350 mW

Notes

a. Derate 10 mW/°C above 25 °C

b. Derate 2.8 mW/°C above 25 °C

SPECIFICATIONS (T_A = 25 °C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Conditions		Typ ^a	Limits						Unit	
					4391		4392		4393			
					Min	Max	Min	Max	Min	Max		
Static												
Gate-Source Breakdown Voltage	V _{(BR)GSS}	I _G = -1 μA, V _{DS} = 0 V		-55	-40		-40		-40		V	
Gate-Source Cutoff Voltage	V _{GS(off)}	V _{DS} = 20 V	2N/PN: I _D = 1 nA		-4	-10	-2	-5	-0.5	-3		
Saturation Drain Current ^b	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V		2N		50	150	25	75	5	30	mA
				PN		50	150	25	100	5	60	
				SST		50		25		5		
Gate Reverse Current	I _{GSS}	V _{GS} = -20 V V _{DS} = 0 V		2N/SST	-5		-100		-100		-100	pA
				PN	-5		-1000		-1000		-1000	
		2N: T _A = 150°C PN: T _A = 100°C SST: T _A = 125°C		-13		-200		-200		-200	nA	
				-1		-200		-200		-200		
				-3								
Gate Operating Current	I _G	V _{DG} = 15 V, I _D = 10 mA		-5								
Drain Cutoff Current	I _{D(off)}	V _{DS} = 20 V	2N: V _{GS} = -5 V	5							100	pA
			2N: V _{GS} = -7 V	5				100				
			2N: V _{GS} = -12 V	5		100						
			PN: V _{GS} = -5 V	0.005						1	nA	
			PN: V _{GS} = -7 V	0.005				1				
			PN: V _{GS} = -12 V	0.005		1						
		SST V _{DS} = 10 V, V _{GS} = -10 V		5		100		100		100	pA	
		V _{DS} = 20 V T _A = 150°C	2N: V _{GS} = -5 V	13						200	nA	
			2N: V _{GS} = -7 V	13				200				
			2N: V _{GS} = -12 V	13		200						
			PN: V _{GS} = -5 V	1						200		
			PN: V _{GS} = -7 V	1				200				
			PN: V _{GS} = -12 V	1		200						
			V _{DS} = 20 V T _A = 100°C									
V _{DS} = 10 V T _A = 125°C			SST: V _{GS} = -10 V	3								
Drain-Source On-Voltage	V _{DS(on)}	V _{GS} = 0 V		I _D = 3 mA	0.25					0.4	V	
				I _D = 6 mA	0.3				0.4			
				I _D = 12 mA	0.35		0.4					
Drain-Source On-Resistance	r _{DS(on)}	V _{GS} = 0 V, I _D = 1 mA				30		60		100	Ω	
Gate-Source Forward Voltage	V _{GS(F)}	I _G = 1 mA V _{DS} = 0 V		2N	0.7		1		1		1	V
				PN/SST	0.7							

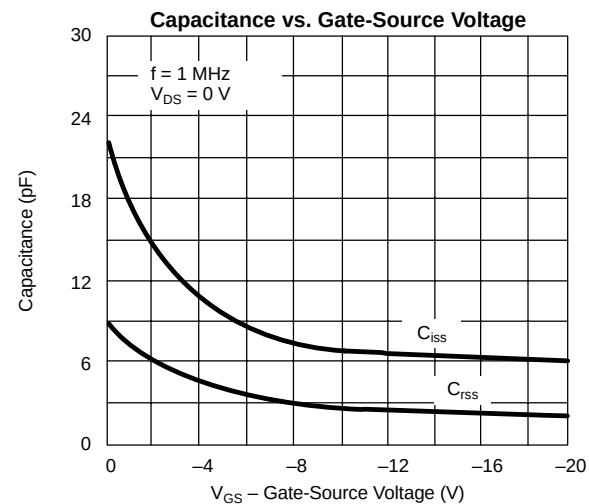
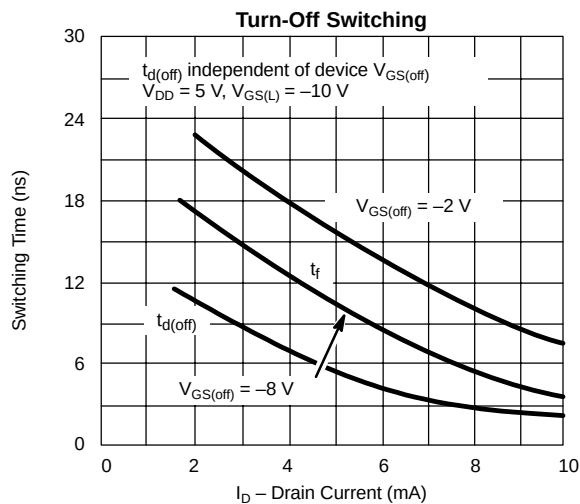
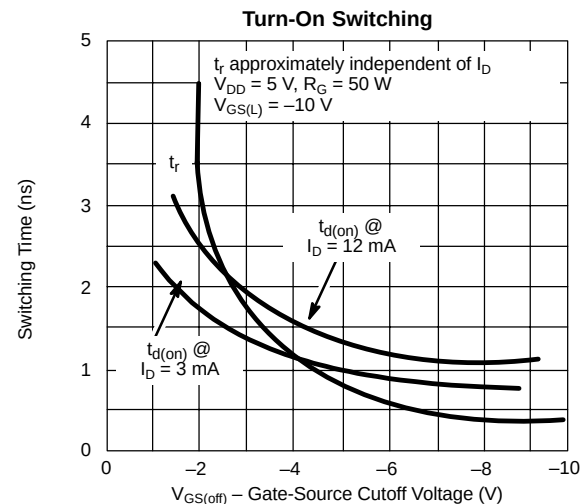
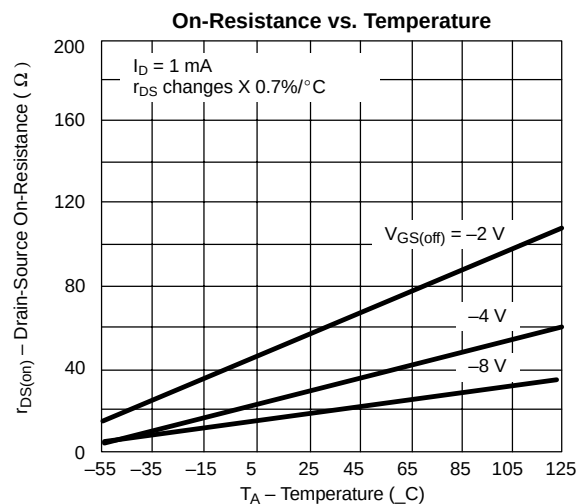
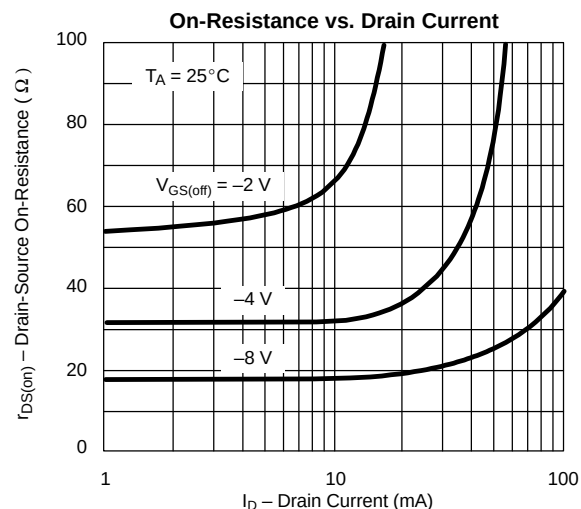
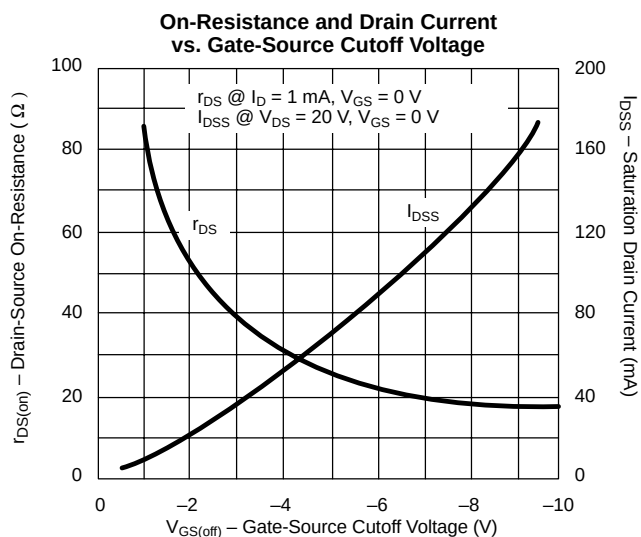
**SPECIFICATIONS (T_A = 25 °C UNLESS OTHERWISE NOTED)**

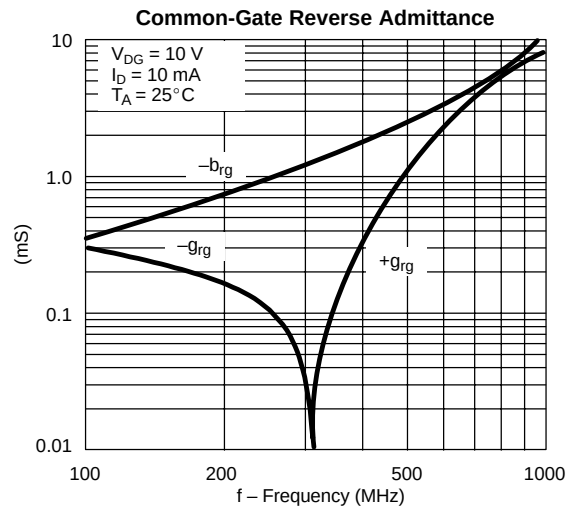
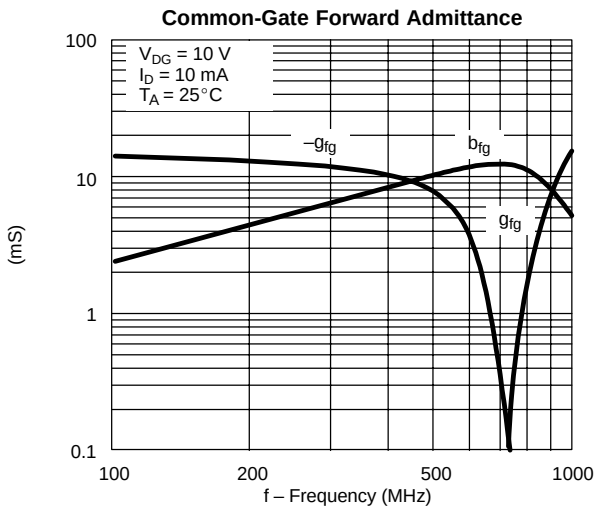
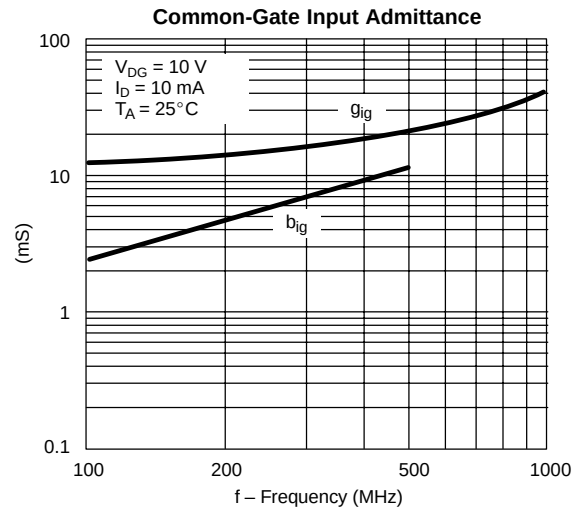
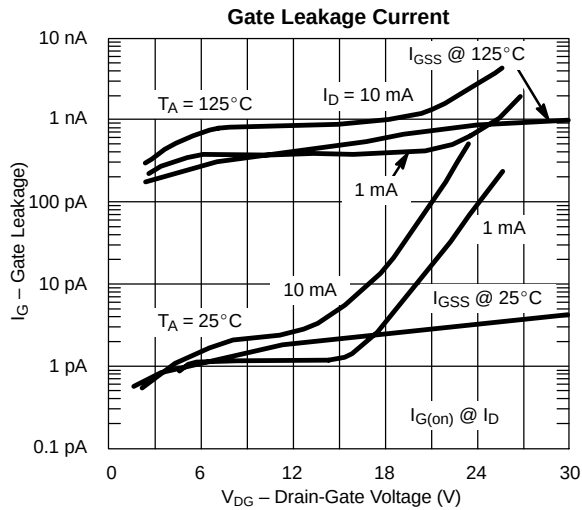
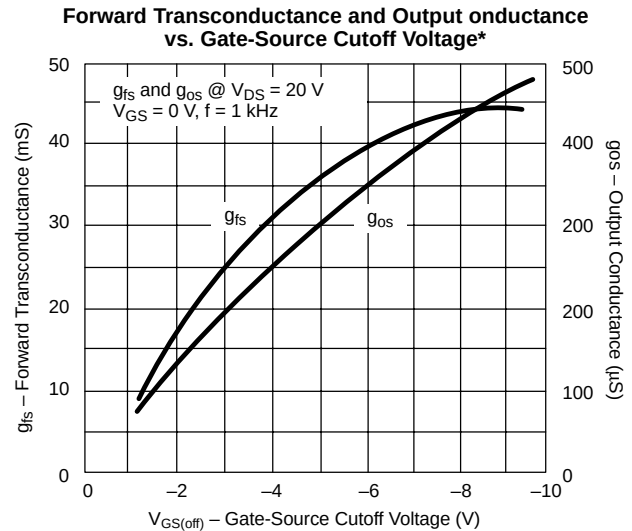
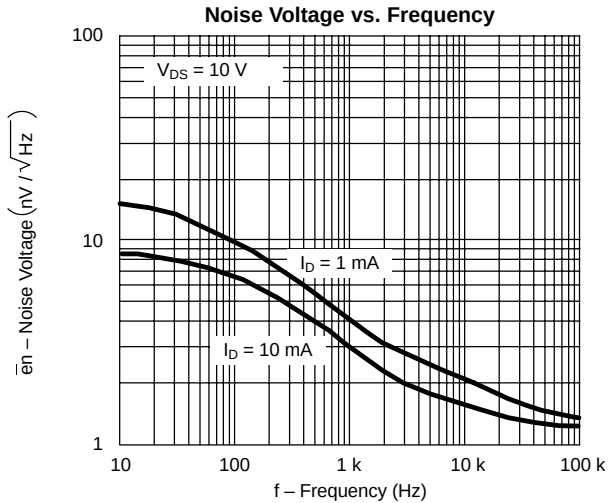
Parameter	Symbol	Test Conditions		Typ ^a	Limits						Unit		
					4391		4392		4393				
					Min	Max	Min	Max	Min	Max			
Dynamic													
Common-Source Forward Transconductance	g_{fs}	$V_{DS} = 20\text{ V}$, $I_D = 1\text{ mA}$, $f = 1\text{ kHz}$		6							mS		
Common-Source Output Conductance	g_{os}			25							μS		
Drain-Source On-Resistance	$r_{DS(on)}$	$V_{GS} = 0\text{ V}$, $I_D = 0\text{ mA}$, $f = 1\text{ kHz}$				30		60		100	Ω		
Common-Source Input Capacitance	C_{iss}	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$		2N	12		14		14		14	pF	
				PN	12		16		16		16		
				SST	13								
Common-Source Reverse Transfer Capacitance	C_{rss}	$V_{DS} = 0\text{ V}$ $f = 1\text{ MHz}$		2N: $V_{GS} = -5\text{ V}$	3.3						3.5		
				2N: $V_{GS} = -7\text{ V}$	3.2				3.5				
				2N: $V_{GS} = -12\text{ V}$	2.8		3.5						
				PN: $V_{GS} = -5\text{ V}$	3.5						5		
				PN: $V_{GS} = -7\text{ V}$	3.4				5				
				PN: $V_{GS} = -12\text{ V}$	3.0		5						
				SST: $V_{GS} = -5\text{ V}$	3.6								
				SST: $V_{GS} = -7\text{ V}$	3.5								
SST: $V_{GS} = -12\text{ V}$	3.1												
Equivalent Input Noise Voltage	$\bar{e}_n$	$V_{DS} = 10\text{ V}$, $I_D = 10\text{ mA}$ $f = 1\text{ kHz}$		3							nV/ $\sqrt{\text{Hz}}$		
Switching													
Turn-On Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}$ $V_{GS(H)} = 0\text{ V}$ See Switching Circuit		2N/PN	2		15		15		15	ns	
				SST	2								
	t_r			2N/PN	2		5		5		5		
				SST	2								
Turn-Off Time	$t_{d(off)}$			2N/PN	6		20		35		50		
				SST	6								
	t_f			2N/PN	13		15		20		30		
				SST	13								

Notes

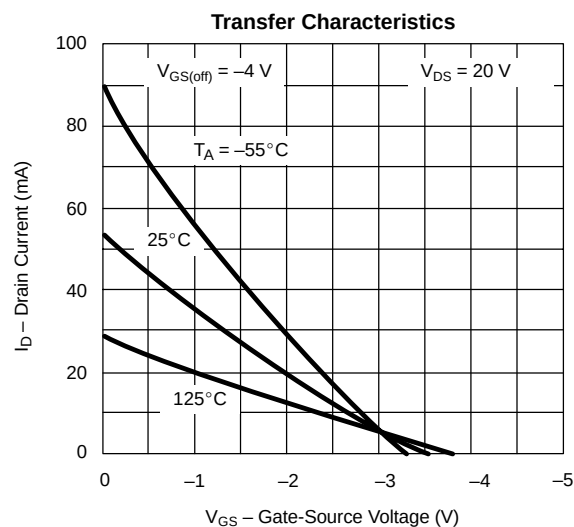
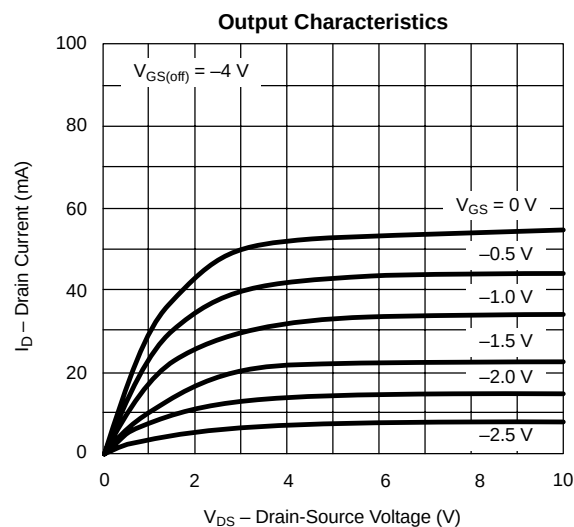
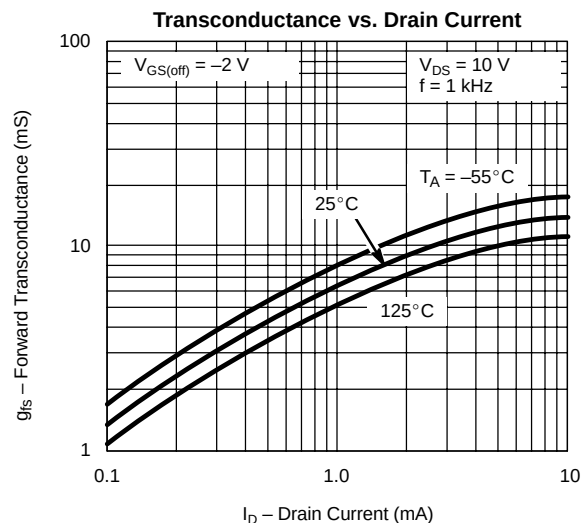
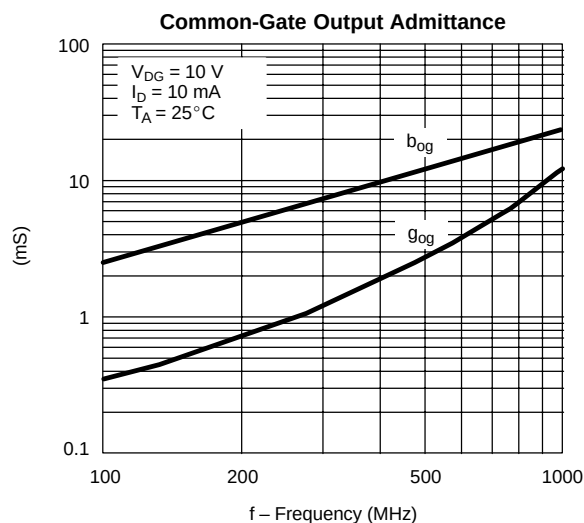
- a. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
b. Pulse test: PW ≤ 300 μs duty cycle ≤ 3%.

NCB

TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)


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SWITCHING TIME TEST CIRCUIT

	4391	4392	4393
$V_{GS(L)}$	-12 V	-7 V	-5 V
R_L^*	800 Ω	1600 Ω	3000 Ω
$I_{D(on)}$	12 mA	6 mA	3 mA

*Non-inductive

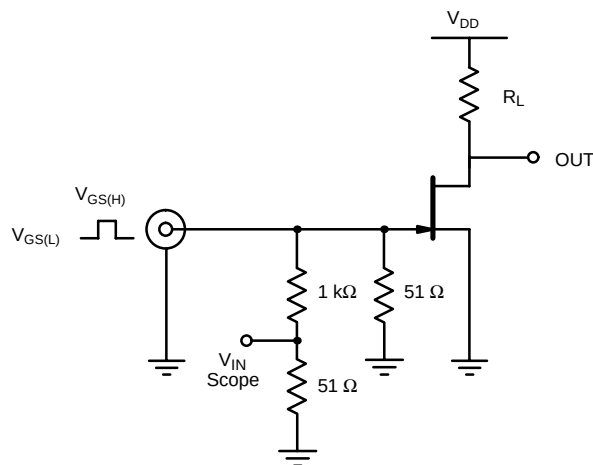
INPUT PULSE

Rise Time < 1 ns
Fall Time < 1 ns
Pulse Width 100 ns
PRF 1 MHz

SAMPLING SCOPE

Rise Time 0.4 ns
Input Resistance 10 M Ω
Input Capacitance 1.5 pF

See Typical Characteristics curves for changes.





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