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

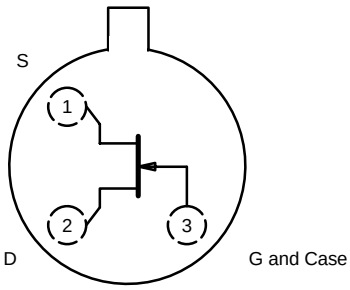
- Analog Switches
- Choppers
- Sample-and-Hold
- Normally “On” Switches
- Current Limiters
- Commutators

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 is 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.

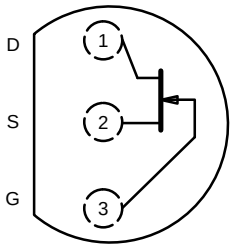
TO-206AA
(TO-18)



Top View

2N4391
2N4392
2N4393

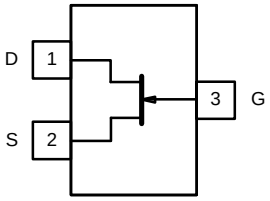
TO-226AA
(TO-92)



Top View

PN4391
PN4392
PN4393

TO-236
(SOT-23)



Top View

SST4391 (CA)*
SST4392 (CB)*
SST4393 (CC)*

*Marking Code for TO-236

For applications information see AN104 and AN106

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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 4391 Min	4391 Max	4392 Min	4392 Max	4393 Min	4393 Max	Unit
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	V
		V_{DS} = 15 V	SST: I_D = 10 nA								
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	–13		–200		–200		–200	nA
			PN: T_A = 100°C	–1		–200		–200		–200	
			SST: T_A = 125°C	–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					
		V_{DS} = 20 V, T_A = 100°C	PN: V_{GS} = –5 V	1						200	
			PN: V_{GS} = –7 V	1				200			
			PN: V_{GS} = –12 V	1		200					
		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)

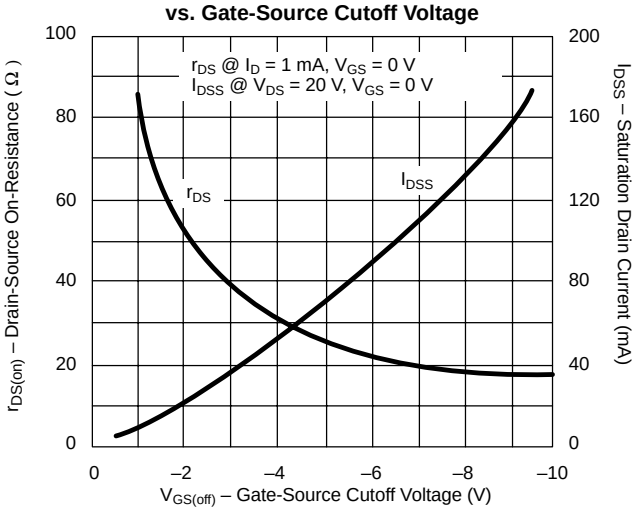
Parameter	Symbol	Test Conditions		Typ[a]	Limits 4391 Min	4391 Max	4392 Min	4392 Max	4393 Min	4393 Max	Unit
Dynamic											
Common-Source Forward Transconductance	g_{fs}	V_{DS} = 20 V, I_D = 1 mA, f = 1 kHz		6							mS
Common-Source Output Conductance	g_{os}	V_{DS} = 20 V, I_D = 1 mA, f = 1 kHz		25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

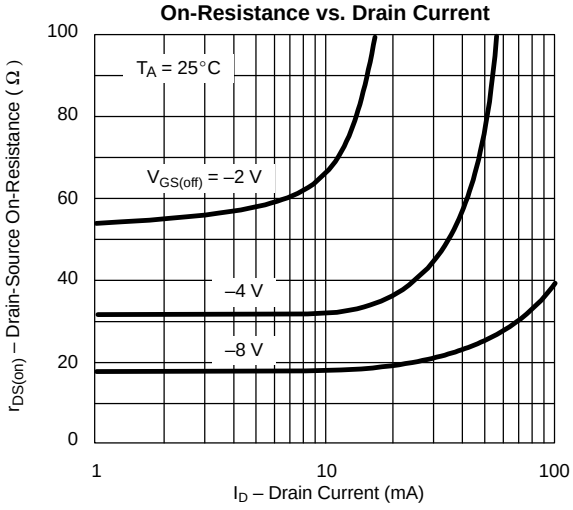
NCB

TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

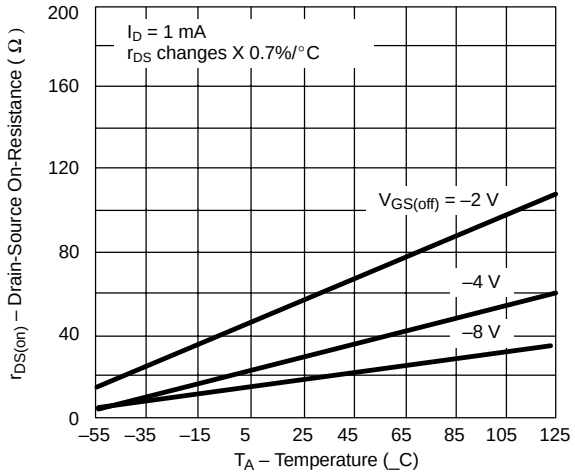
On-Resistance and Drain Current vs. Gate-Source Cutoff Voltage



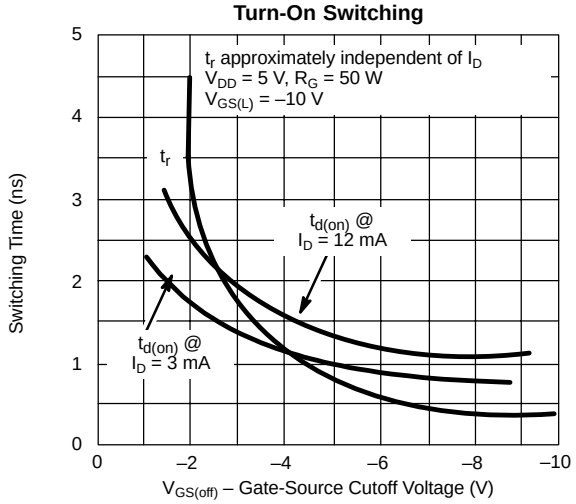
On-Resistance vs. Drain Current



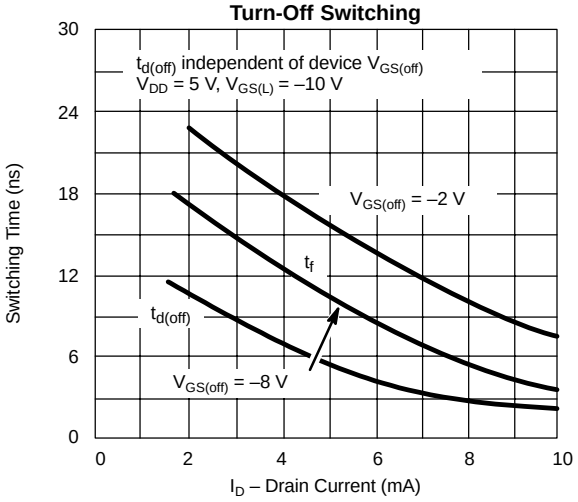
On-Resistance vs. Temperature



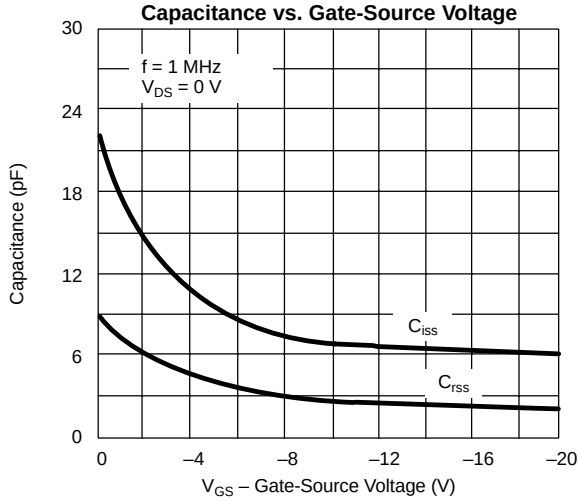
Turn-On Switching



Turn-Off Switching

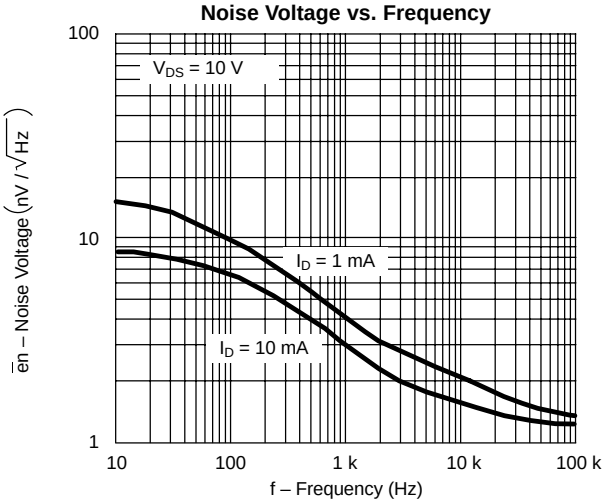


Capacitance vs. Gate-Source Voltage

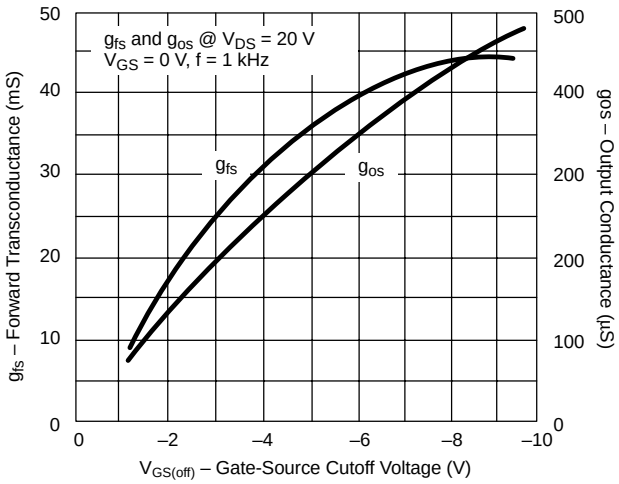


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

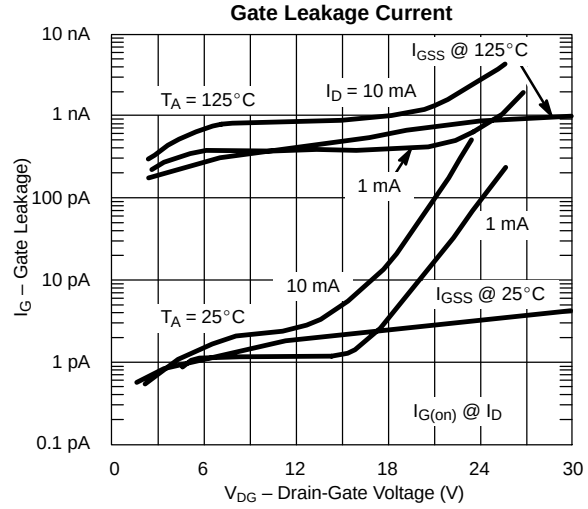
Noise Voltage vs. Frequency



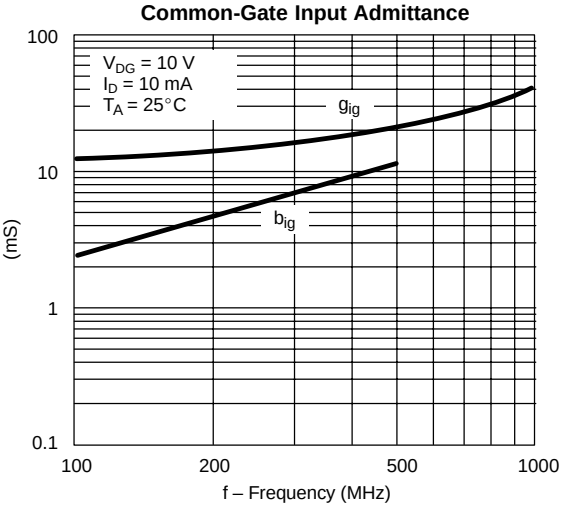
Forward Transconductance and Output onductance vs. Gate-Source Cutoff Voltage*



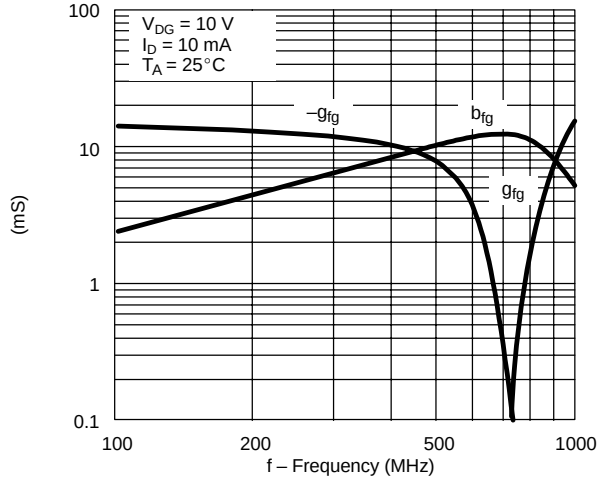
Gate Leakage Current



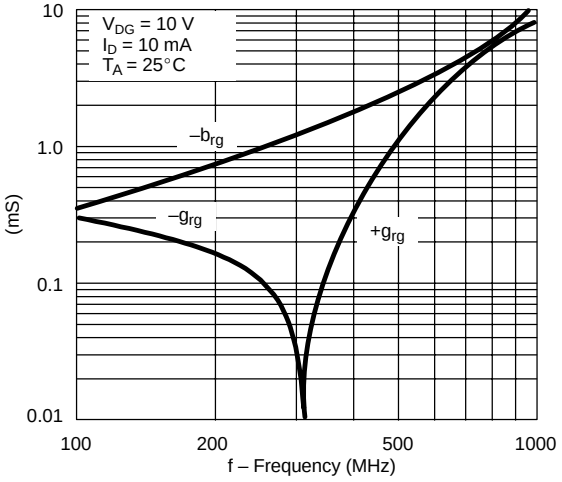
Common-Gate Input Admittance



Common-Gate Forward Admittance

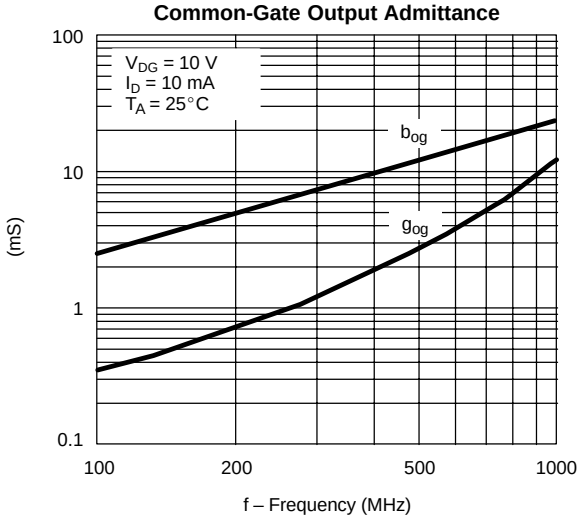


Common-Gate Reverse Admittance

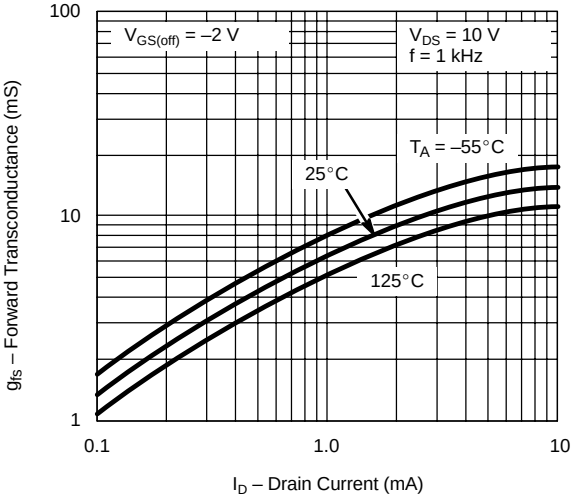


TYPICAL CHARACTERISTICS (T_A = 25°C UNLESS OTHERWISE NOTED)

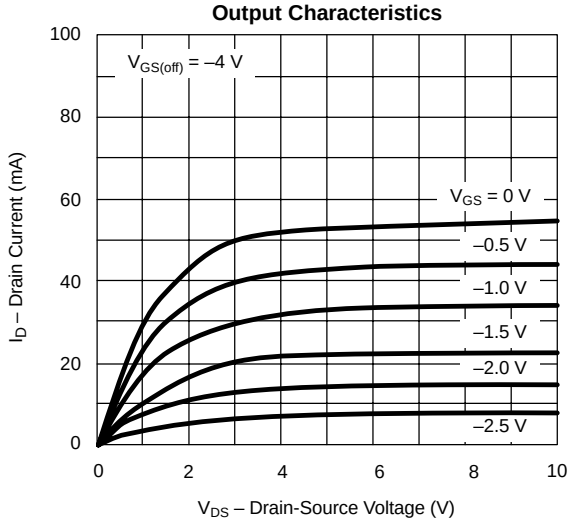
Common-Gate Output Admittance



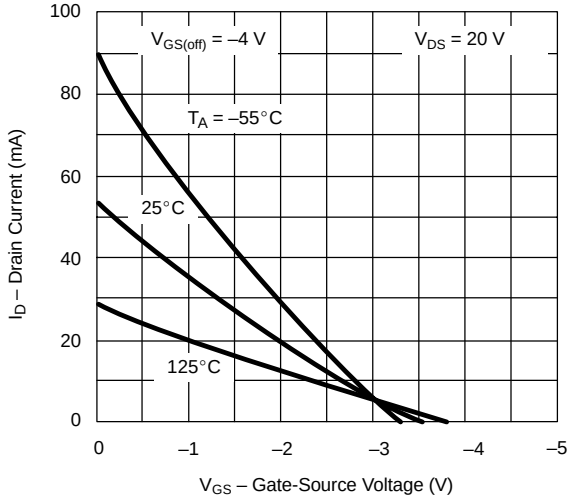
Transconductance vs. Drain Current



Output Characteristics



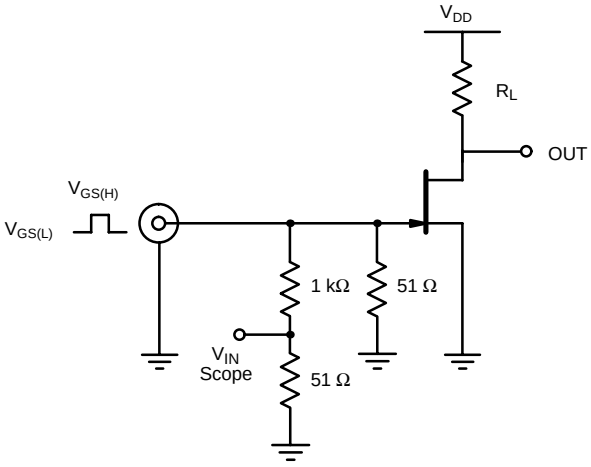
Transfer Characteristics



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 MΩ
Input Capacitance 1.5 pF

See Typical Characteristics curves for changes.

Disclaimer

All product specifications and data are subject to change without notice.

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