

N-Channel Depletion-Mode MOS Transistors

Product Summary

Part Number	$V_{(BR)DSV}$ Min (V)	$r_{DS(on)}$ Max (Ω)	$V_{GS(off)}$ (V)	I_D (A)
ND2012L	200	12	-1.5 to -4	0.16
ND2020L		20	-0.5 to -2.5	0.132

For applications information see AN901.

Features

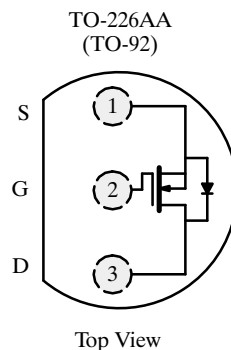
- High Breakdown Voltage: 220 V
- Normally “On” Low r_{DS} Switch: 9 Ω
- Low Input and Output Leakage
- Low-Power Drive Requirement
- Low Input Capacitance

Benefits

- Full-Voltage Operation
- Low Offset Voltage
- Low Error Voltage
- Easily Driven Without Buffer
- High-Speed Switching

Applications

- Normally “On” Switching Circuits
- Current Sources/Limiters
- Power Supply, Converter Circuits
- Solid-State Relays
- Telecom Switches



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	ND2012L	ND2020L	Unit
Drain-Source Voltage	V_{DS}	200	200	V
Gate-Source Voltage	V_{GS}	± 30	± 30	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_A = 25^\circ\text{C}$	0.16	A
		$T_A = 100^\circ\text{C}$	0.1	
Pulsed Drain Current	I_{DM}	0.8	0.8	
Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	0.8	W
		$T_A = 100^\circ\text{C}$	0.32	
Maximum Junction-to-Ambient	R_{thJA}	156	156	$^\circ\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$

Notes

- a. Pulse width limited by maximum junction temperature.

ND2012L/2020L

Specifications^a

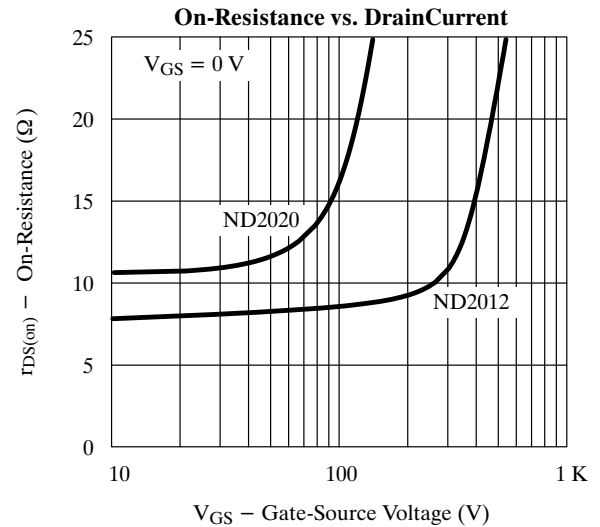
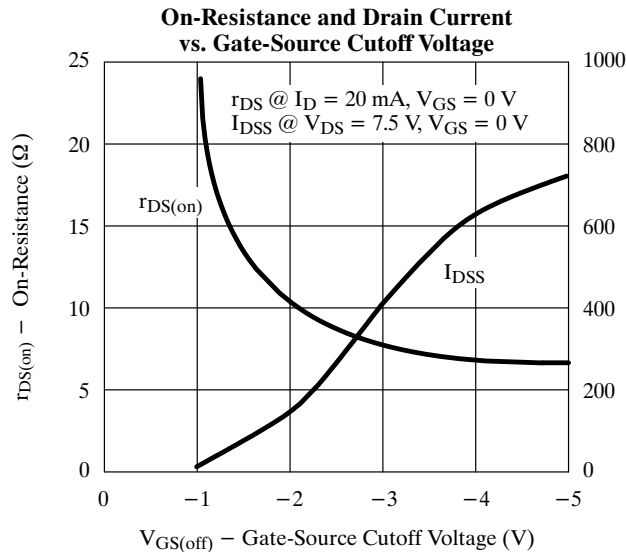
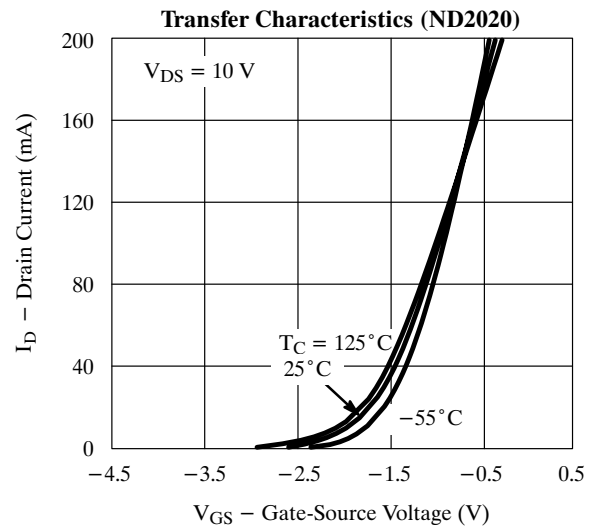
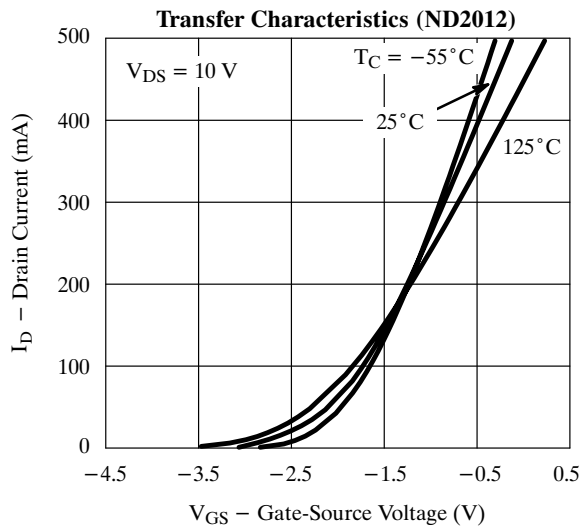
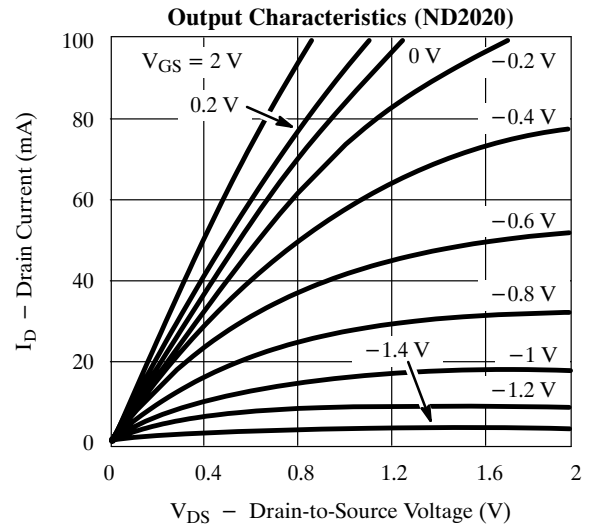
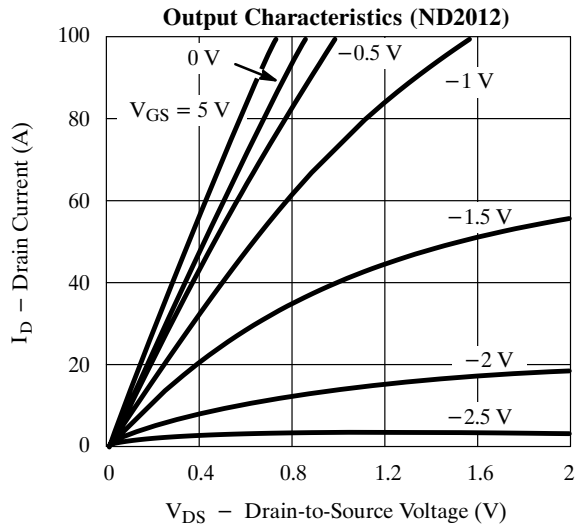
Parameter	Symbol	Test Conditions	Typ ^b	Limits				Unit	
				ND2012L		ND2020L			
				Min	Max	Min	Max		
Static									
Drain-Source Breakdown Voltage	$V_{(BR)DSV}$	$V_{GS} = -8\text{ V}, I_D = 10\ \mu\text{A}$	220	200				V	
		$V_{GS} = -5\text{ V}, I_D = 10\ \mu\text{A}$	220			200			
Gate-Source Cutoff Voltage	$V_{GS(th)}$	$V_{DS} = 5\text{ V}, I_D = 10\ \mu\text{A}$		-1.5	-4	-0.5	-2.5		
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ $T_J = 125^\circ\text{C}$			± 10		± 10	nA	
					± 50		± 50		
Drain Cutoff Current	$I_{D(off)}$	$V_{DS} = 160\text{ V}, V_{GS} = -8\text{ V}$ $T_J = 125^\circ\text{C}$			1			μA	
					200				
		$V_{DS} = 160\text{ V}, V_{GS} = -5\text{ V}$ $T_J = 125^\circ\text{C}$					1		
							200		
Drain-Saturation Current ^c	I_{DSS}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}$	300	30		30		mA	
Drain-Source On-Resistance ^c	$r_{DS(on)}$	$V_{GS} = 2\text{ V}, I_D = 20\text{ mA}$	7					Ω	
		$V_{GS} = 0\text{ V}, I_D = 20\text{ mA}$ $T_J = 125^\circ\text{C}$	8		12		20		
			12.6		30		50		
Forward Transconductance ^c	g_{fs}	$V_{DS} = 7.5\text{ V}, I_D = 20\text{ mA}$	55					mS	
Common Source Output Conductance ^c	g_{os}		75					μS	
Dynamic									
Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = -5\text{ V}, f = 1\text{ MHz}$	35		100		100	pF	
Output Capacitance	C_{oss}		10		20		20		
Reverse Transfer Capacitance	C_{rss}		2		5		5		
Switching^d									
Turn-On Time	$t_{d(on)}$	$V_{DD} = 25\text{ V}, R_L = 1250\ \Omega$ $I_D \cong 20\text{ mA}, V_{GEN} = -5\text{ V}$ $R_G = 25\ \Omega$	20					ns	
	t_r		20						
Turn-Off Time	$t_{d(off)}$		10						
	t_f		10						

Notes

- $T_A = 25^\circ\text{C}$ unless otherwise noted.
- For DESIGN AID ONLY, not subject to production testing.
- Pulse test: $PW \leq 300\ \mu\text{s}$ duty cycle $\leq 2\%$.
- Switching time is essentially independent of operating temperature.

VDDQ20

Typical Characteristics (25°C Unless Otherwise Noted)



ND2012L/2020L

Typical Characteristics (25°C Unless Otherwise Noted) (Cont'd)

