



# N-Channel Enhancement-Mode MOSFET Transistor

**Zener Gate Protected**

PRODUCT SUMMARY			
$V_{(BR)DSS}$ Min (V)	$r_{DS(on)}$ Max ( $\Omega$ )	$V_{GS(th)}$ (V)	$I_D$ (A)
60	5 @ $V_{GS} = 10$ V	0.8 to 2.5	0.31

### FEATURES

- Zener Diode Input Protected
- Low On-Resistance: 3  $\Omega$
- Ultralow Threshold: 1.2 V
- Low Input Capacitance: 38 pF
- Low Input and Output Leakage

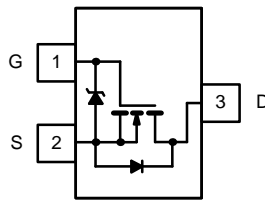
### BENEFITS

- Extra ESD Protection
- Low Offset Voltage
- Low-Voltage Operation
- High-Speed, Easily Driven
- Low Error Voltage

### APPLICATIONS

- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays
- Inductive Load Drivers

SC-59



Top View

VN10KC

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)			
Parameter	Symbol	Limits	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	15/-0.3	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$I_D$	$T_A = 25^\circ\text{C}$	0.31
		$T_A = 100^\circ\text{C}$	0.20
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	0.6	A
Power Dissipation	$P_D$	$T_A = 25^\circ\text{C}$	0.6
		$T_A = 100^\circ\text{C}$	0.24
Maximum Junction-to-Ambient	$R_{thJA}$	208	$^\circ\text{C/W}$
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.



SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Conditions	Typ <sup>a</sup>	Limits		Unit
				Min	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	120	60		V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	1.2	0.8	2.5	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = 15\text{ V}$	1		100	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$ $T_J = 125^\circ\text{C}$			10	$\mu\text{A}$
					500	
On-State Drain Current <sup>b</sup>	$I_{D(on)}$	$V_{DS} = 10\text{ V}, V_{GS} = 10\text{ V}$	1	0.75		A
Drain-Source On-Resistance <sup>b</sup>	$r_{DS(on)}$	$V_{GS} = 5\text{ V}, I_D = 0.2\text{ A}$ $V_{GS} = 10\text{ V}, I_D = 0.5\text{ A}$ $T_J = 125^\circ\text{C}$	4		7.5	$\Omega$
			3		5	
			5.6		9	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 10\text{ V}, I_D = 0.5\text{ A}$	300	100		mS
Common Source Output Conductance <sup>b</sup>	$g_{os}$	$V_{DS} = 7.5\text{ V}, I_D = 0.05\text{ A}$	0.2			
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	38		60	pF
Output Capacitance	$C_{oss}$		16		25	
Reverse Transfer Capacitance	$C_{rss}$		2		5	
<b>Switching<sup>c</sup></b>						
Turn-On Time	$t_{ON}$	$V_{DD} = 15\text{ V}, R_L = 23\ \Omega$ $I_D = 0.6\text{ A}, V_{GEN} = 10\text{ V}$ $R_G = 25\ \Omega$	7		10	ns
Turn-Off Time	$t_{OFF}$		9		10	

## Notes

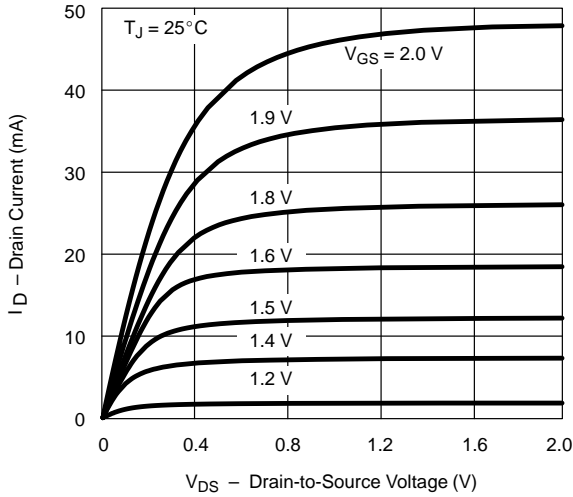
- For DESIGN AID ONLY, not subject to production testing.
- Pulse test:  $PW \leq 300\ \mu\text{s}$  duty cycle  $\leq 2\%$ .
- Switching time is essentially independent of operating temperature.

VNNDP06

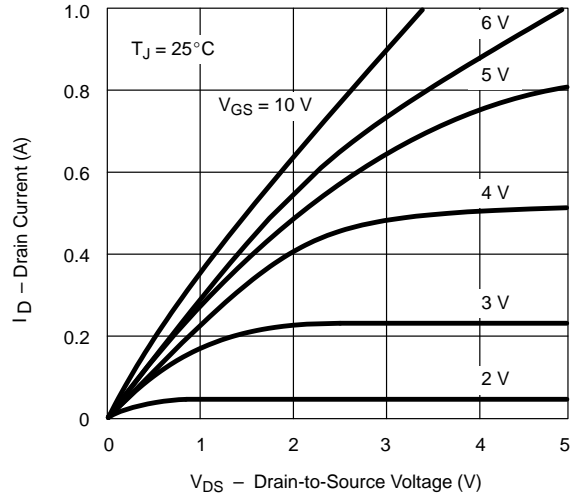


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

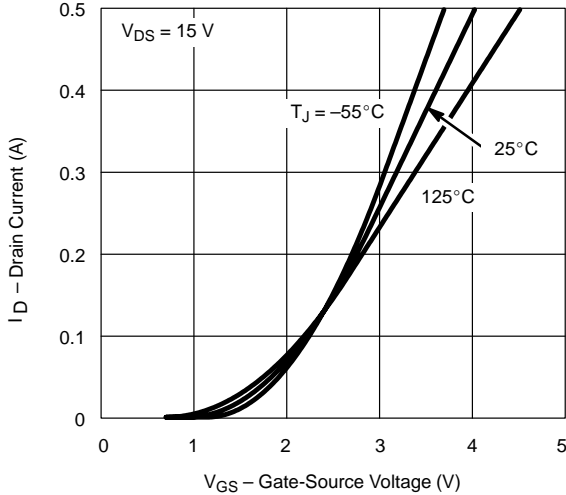
**Ohmic Region Characteristics**



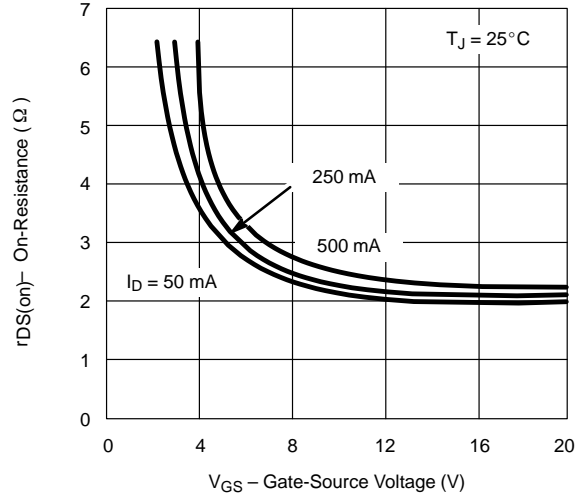
**Output Characteristics for Low Gate Drive**



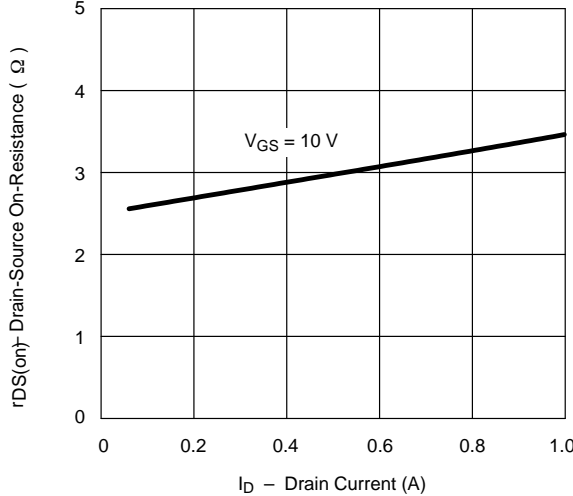
**Transfer Characteristics**



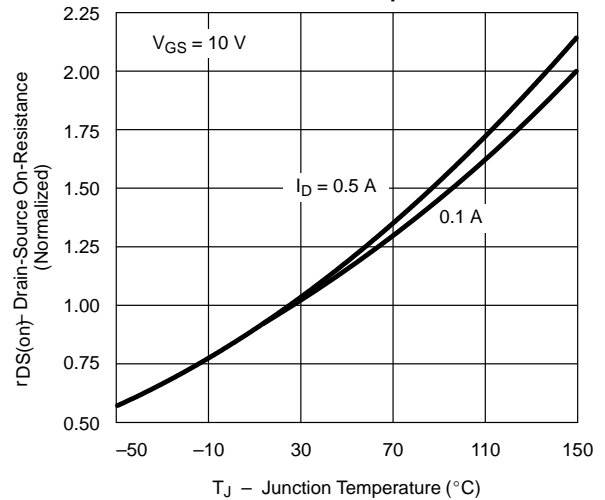
**On-Resistance vs. Gate-to-Source Voltage**



**On-Resistance vs. Drain Current**



**Normalized On-Resistance vs. Junction Temperature**





### TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

