

500V N-Channel Enhancement Mode MOSFET

General Description

5N50 use advanced VD MOST technology to provide low $R_{DS(ON)}$, low gate charge, fast switching. This device is specially designed to get better ruggedness and suitable to use in

Features

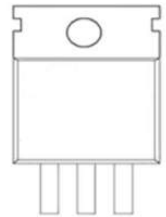
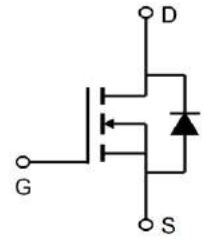
High EAS
 extremely low switching loss
 Excellent stability and uniformity or Invertors

Applications

Consumer electronic power supply Motor control
 Synchronous-rectification Isolated AC
 Synchronous-rectification applications

General Features

$V_{DS} = 500V$ $I_D = 5A$
 $R_{DS(ON)} < 1.2\Omega @ V_{GS}=10V$



Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	500	V
Continuous Drain Current	I_D	5	A
Pulsed Drain Current (note1)	I_{DM}	28	A
Gate-Source Voltage	V_{GSS}	± 30	V
Single Pulse Avalanche Energy (note2)	E_{AS}	176	mJ
Avalanche Current (note1)	I_{AR}	4.2	A
Repetitive Avalanche Energy (note1)	E_{AR}	35	mJ
Power Dissipation ($T_C = 25^\circ C$)	P_D	83	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ C$
Thermal Resistance, Junction-to-Case	R_{thJC}	2.3	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	

500V N-Channel Enhancement Mode MOSFE
Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	500	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 3.5A$	--	1	1.2	Ω
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V, f = 1.0MHz$	--	700	--	pF
Output Capacitance	C_{oss}		--	94	--	
Reverse Transfer Capacitance	C_{rss}		--	12	--	
Total Gate Charge	Q_g	$V_{DD} = 400V, I_D = 7A,$ $V_{GS} = 10V$	--	19	--	nC
Gate-Source Charge	Q_{gs}		--	3.7	--	
Gate-Drain Charge	Q_{gd}		--	11	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 250V, I_D = 7A,$ $R_G = 25\Omega$	--	13	--	ns
Turn-on Rise Time	t_r		--	20	--	
Turn-off Delay Time	$t_{d(off)}$		--	76	--	
Turn-off Fall Time	t_f		--	40	--	
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	7.0	A
Pulsed Diode Forward Current	I_{SM}		--	--	28	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 7A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 7A,$ $di_f/dt = 100A/\mu s$	--	260	--	ns
Reverse Recovery Charge	Q_{rr}		--	3.8	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 4.2A, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s, \text{Duty Cycle} \leq 1\%$

500V N-Channel Enhancement Mode MOSFET

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

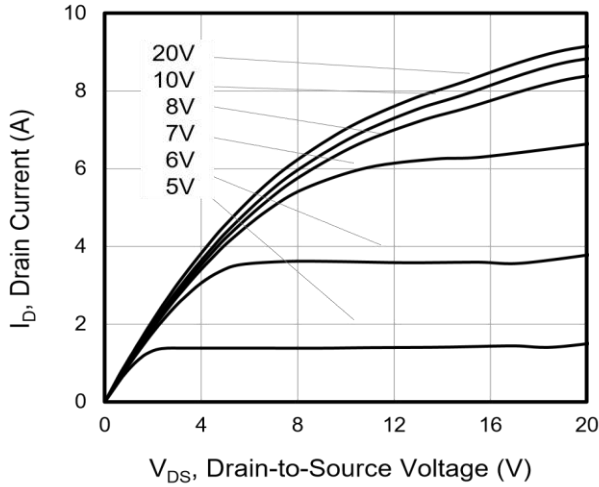


Figure 2. Body Diode Forward Voltage

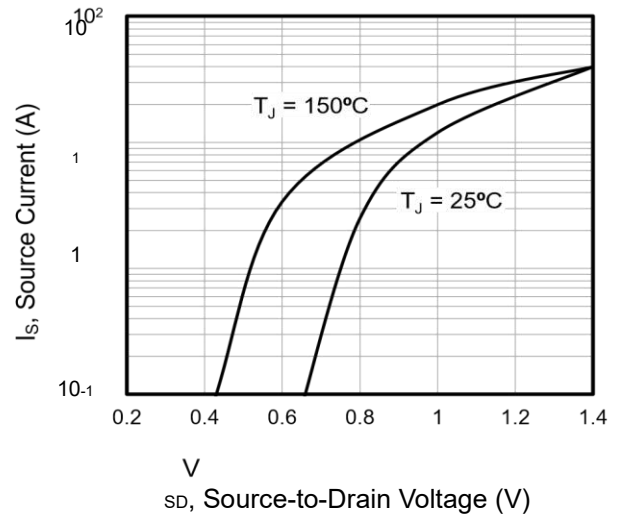


Figure 3. Drain Current vs. Temperature

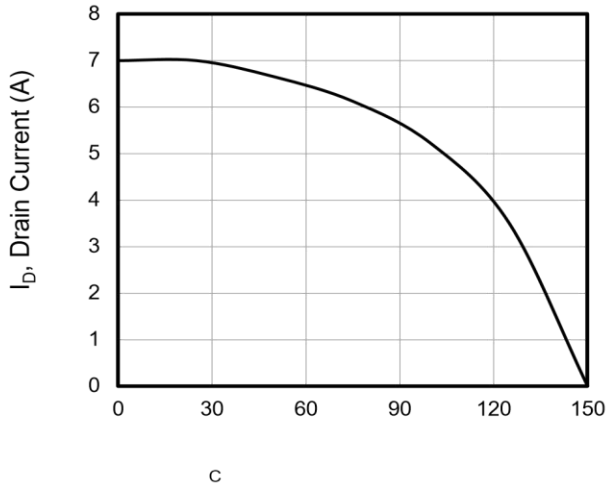


Figure 4. BV_{DSS} Variation vs. Temperature

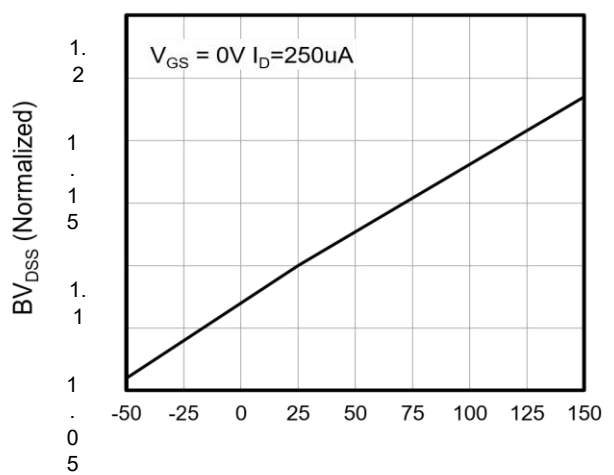


Figure 5. Transfer Characteristics

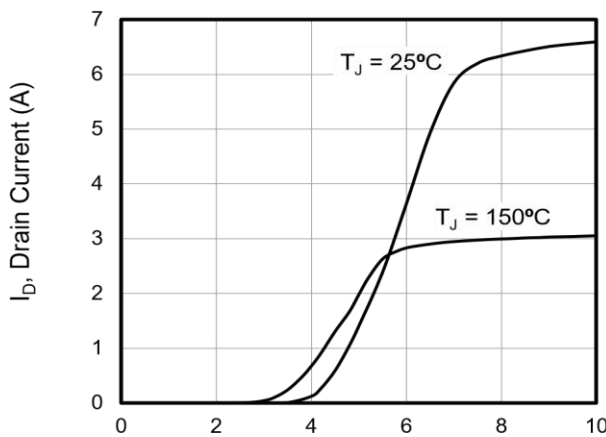
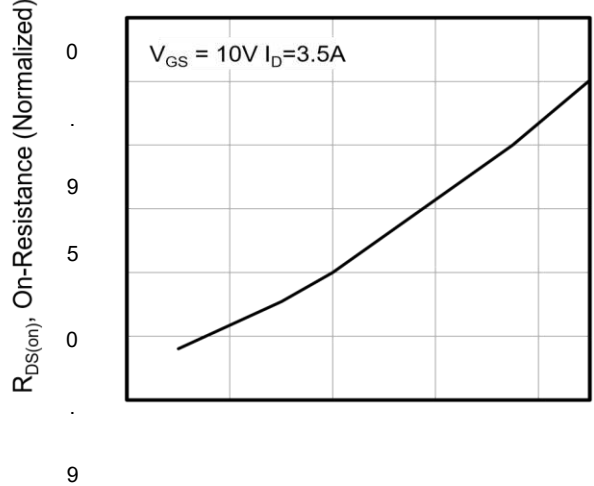
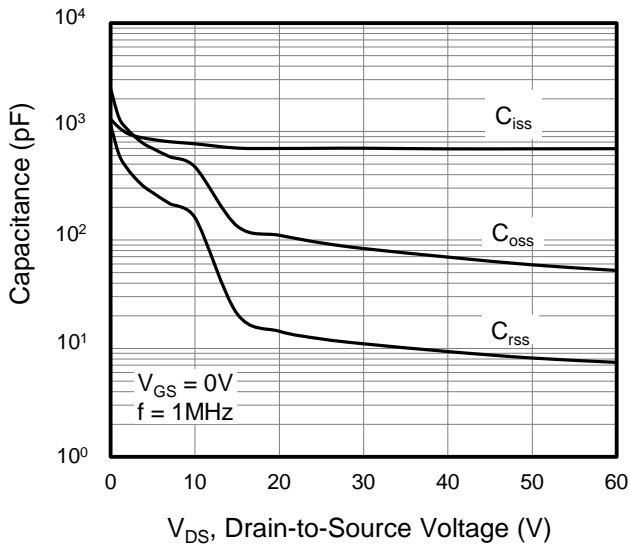
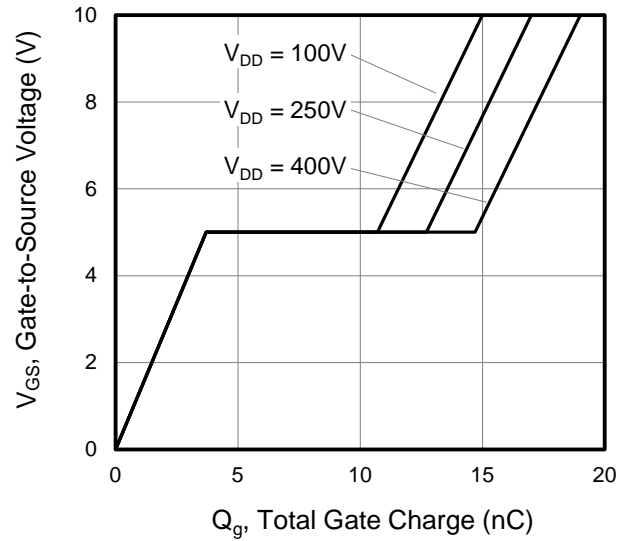
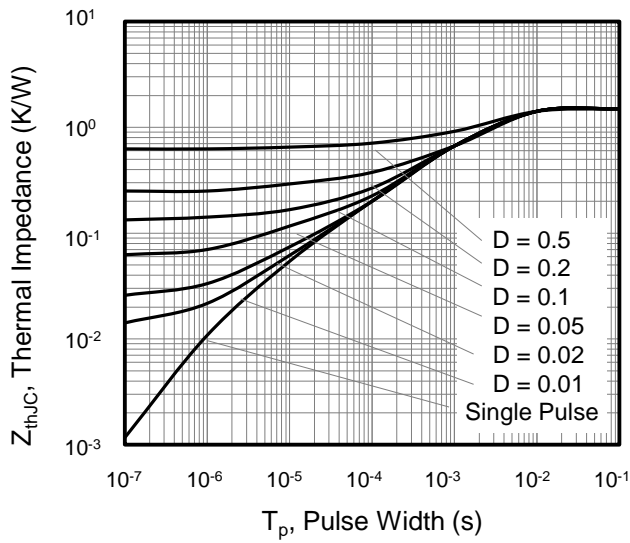
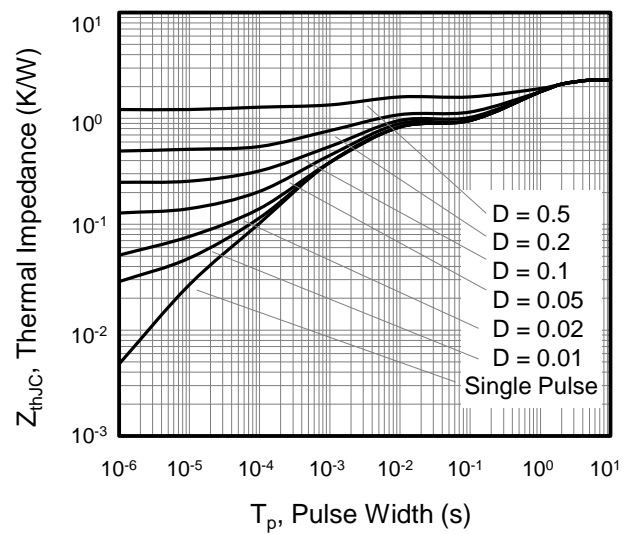


Figure 6. On-Resistance vs. Temperature



T_C , Case Temperature ($^\circ\text{C}$)

T_C , Case Temperature ($^\circ\text{C}$)

500V N-Channel Enhancement Mode MOSFET
Figure 7. Capacitance

Figure 8. Gate Charge

Figure 9. Transient Thermal Impedance
TO-262, TO-251, TO-252

Figure 10. Transient Thermal Impedance
TO-220F


500V N-Channel Enhancement Mode MOSFET

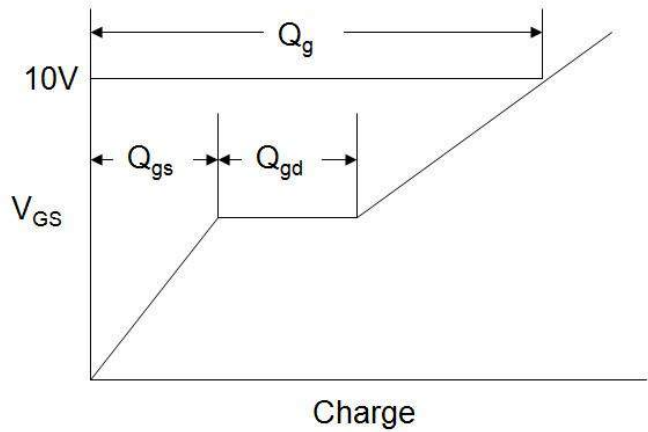
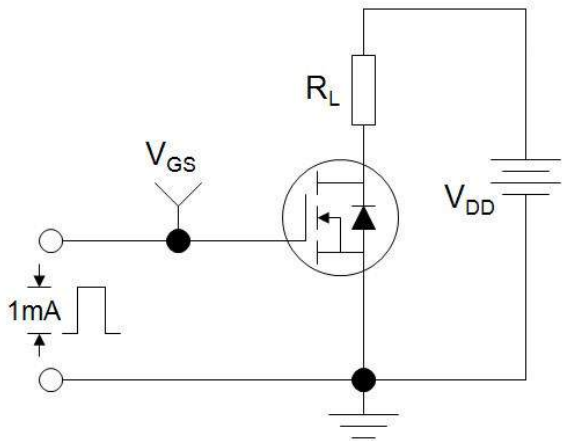


Figure B: Resistive Switching Test Circuit and Waveform

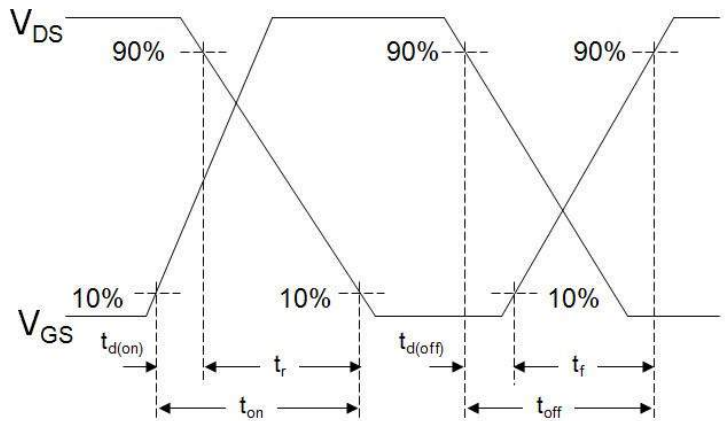
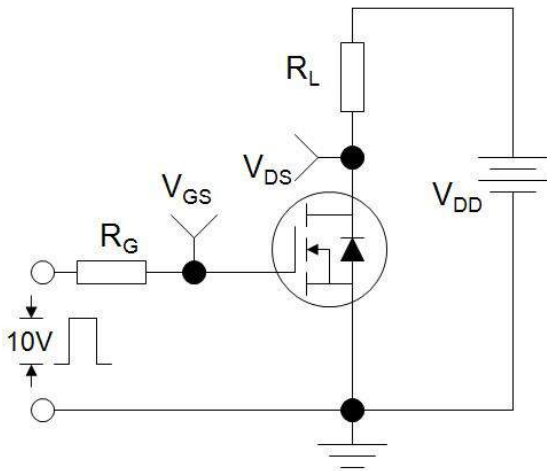
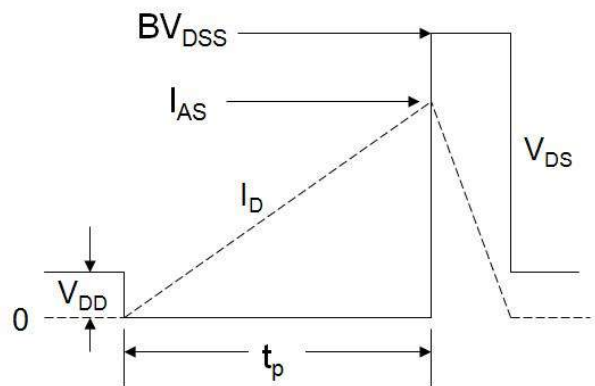
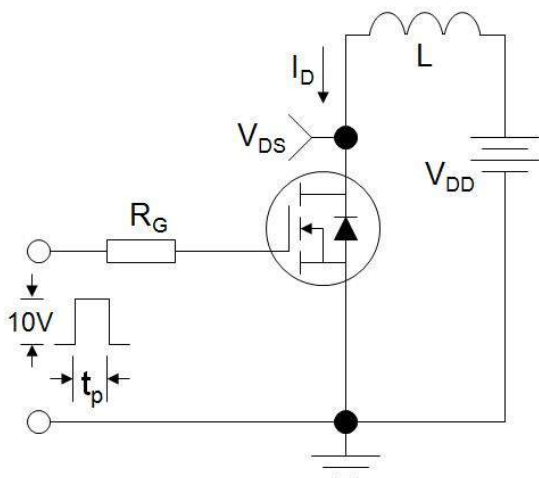


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



500V N-Channel Enhancement Mode MOSFET Package Mechanical Data TO-220F

