

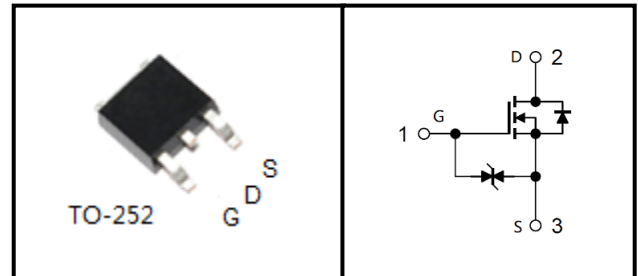
530V N-Channel MOSFET

FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- Enhanced ESD protection

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



Device Marking and Package Information		
Device	Package	Marking
HD7N50E	TO-252	HD7N50E

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted				
Parameter	Symbol	Value	Unit	
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	V_{DSS}	530	V	
Continuous Drain Current	I_D	7	A	
Pulsed Drain Current (note1)	I_{DM}	24	A	
Gate-Source Voltage	V_{GSS}	± 30	V	
Single Pulse Avalanche Energy (note2)	E_{AS}	73	mJ	
Avalanche Current (note1)	I_{AS}	4.5	A	
Repetitive Avalanche Energy (note1)	E_{AR}	43.3	mJ	
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	45	W	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	$^\circ\text{C}$	

Thermal Resistance				
Parameter	Symbol	Value	Unit	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.98	$^\circ\text{C}/\text{W}$	
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5		

Specifications $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	530	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 550V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	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)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 3.5A$	--	1.05	1.3	Ω
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $V_{DS} = 25V,$ $f = 1.0\text{MHz}$	--	750	--	pF
Output Capacitance	C_{oss}		--	86	--	
Reverse Transfer Capacitance	C_{rss}		--	11.5	--	
Total Gate Charge	Q_g	$V_{DD} = 440V, I_D = 7A,$ $V_{GS} = 10V$	--	15.5	--	nC
Gate-Source Charge	Q_{gs}		--	2.9	--	
Gate-Drain Charge	Q_{gd}		--	6.4	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 275V, I_D = 7A,$ $R_G = 25\Omega$	--	15	--	ns
Turn-on Rise Time	t_r		--	18	--	
Turn-off Delay Time	$t_{d(off)}$		--	80	--	
Turn-off Fall Time	t_f		--	35	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^\circ\text{C}$	--	--	7	A
Pulsed Diode Forward Current	I_{SM}		--	--	24	
Body Diode Voltage	V_{SD}	$T_J = 25^\circ\text{C}, I_{SD} = 3.5A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 7A,$ $di_F/dt = 100A/\mu s$	--	100	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.45	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10\text{mH}, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

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

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

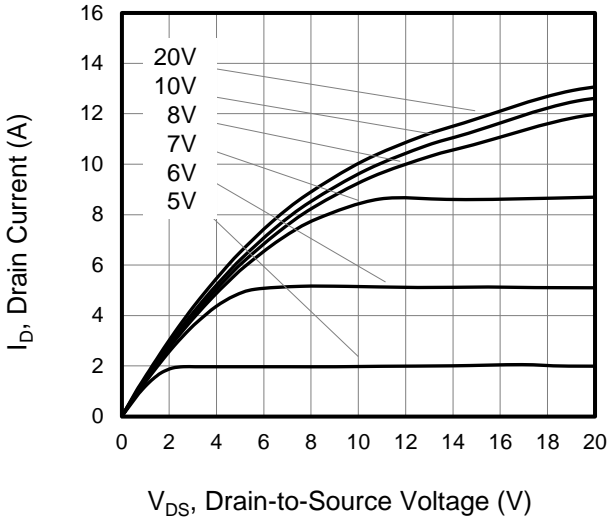


Figure 2. Body Diode Forward Voltage

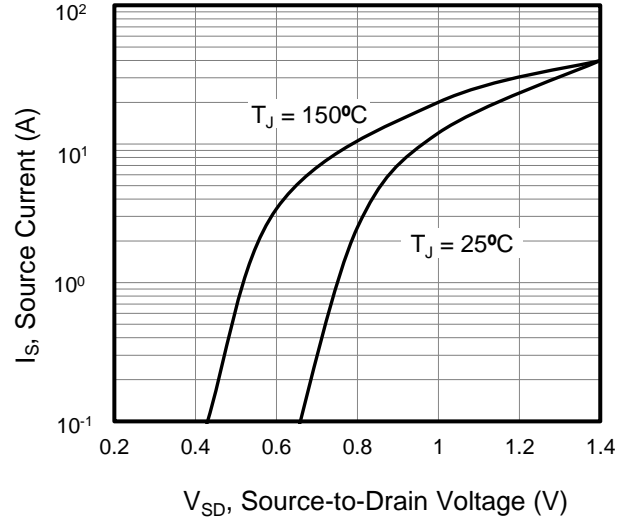


Figure 3. Drain Current vs. Temperature

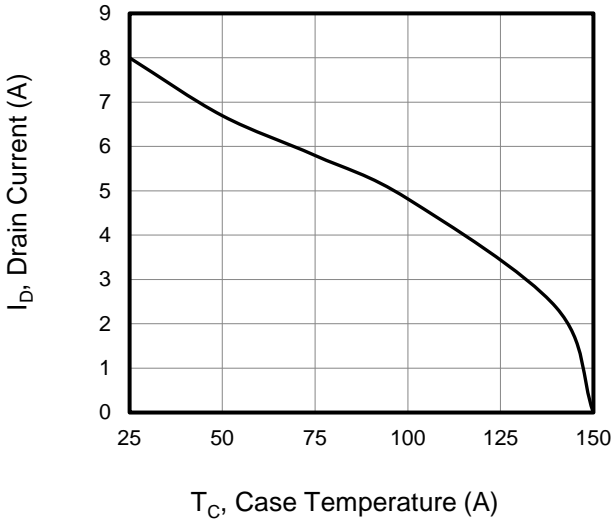


Figure 4. BV_{DSS} Variation vs. Temperature

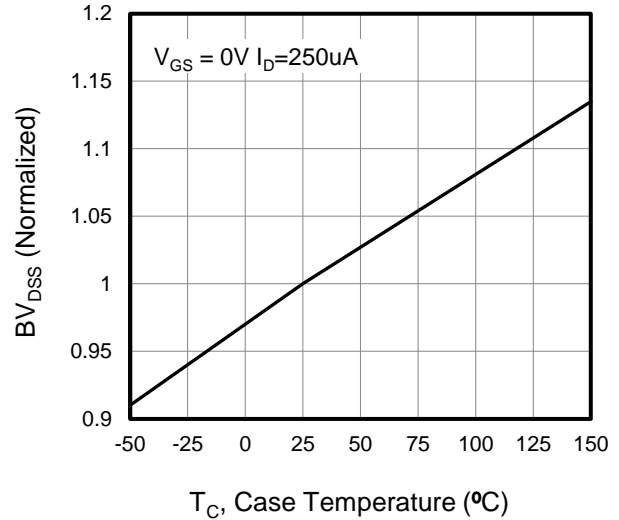


Figure 5. Transfer Characteristics

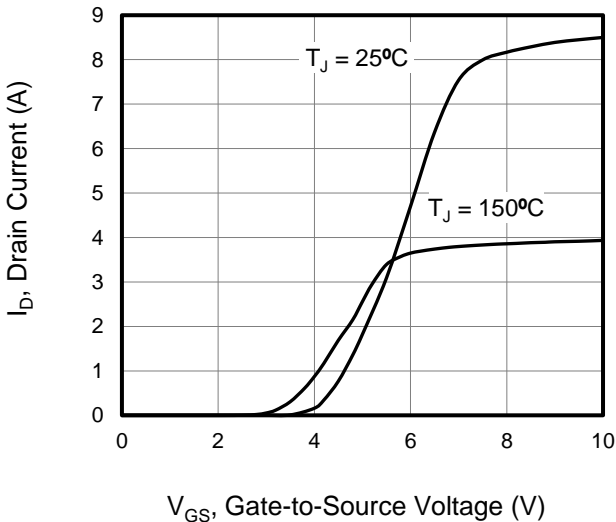
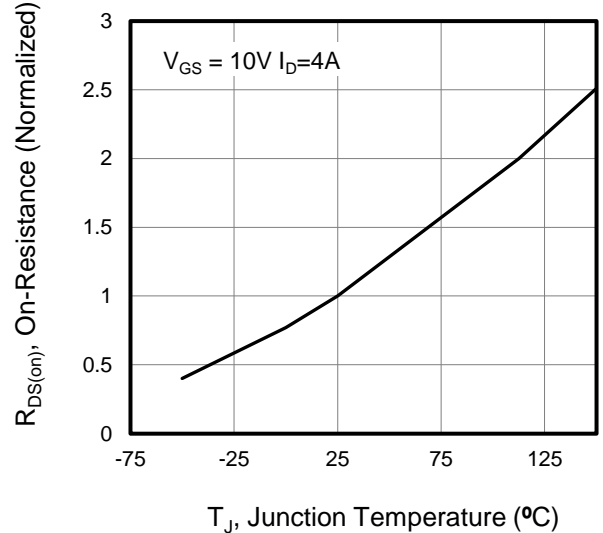


Figure 6. On-Resistance vs. Temperature



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

Figure 7. Capacitance

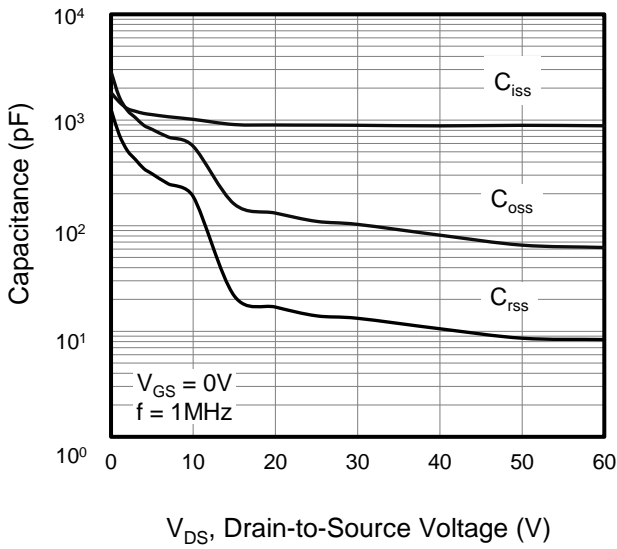


Figure 8. Gate Charge

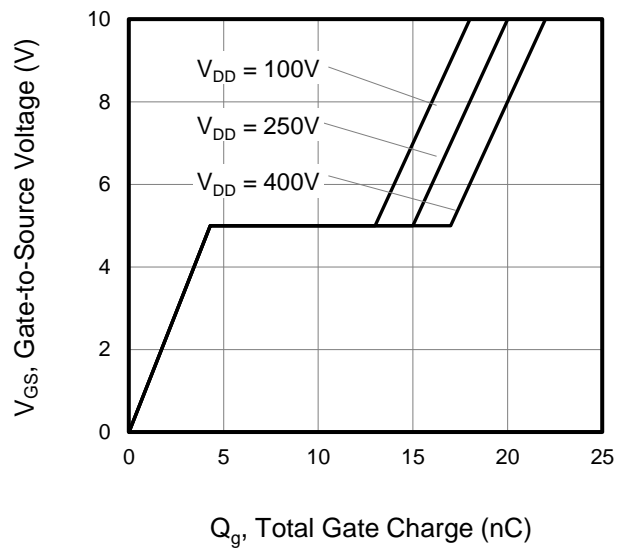


Figure 9. Transient Thermal Impedance

TO-220F

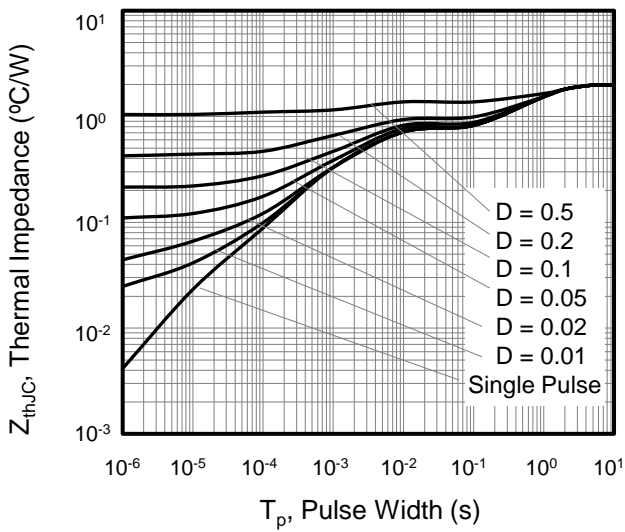


Figure A: Gate Charge Test Circuit and Waveform



Figure B: Resistive Switching Test Circuit and Waveform

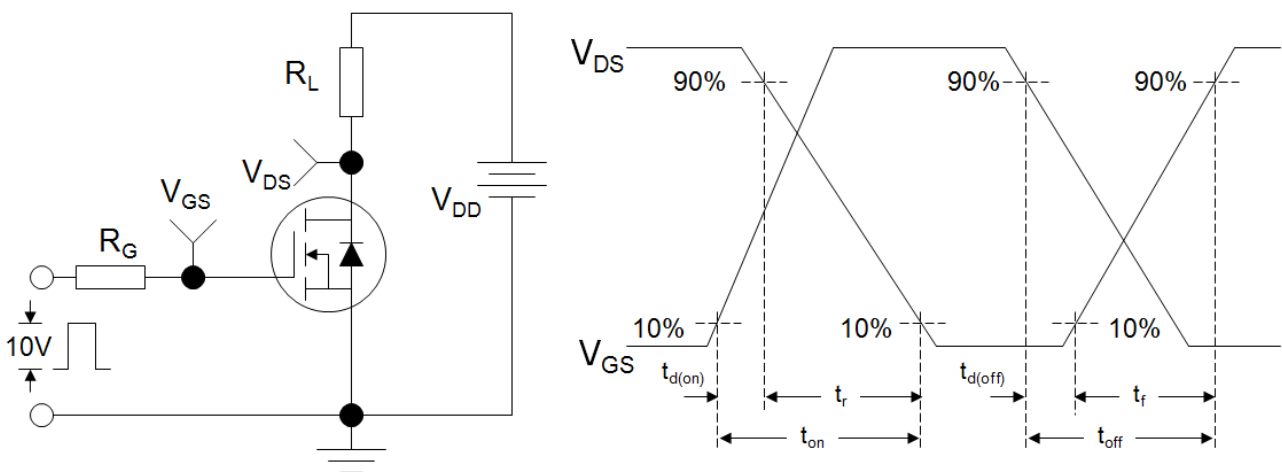
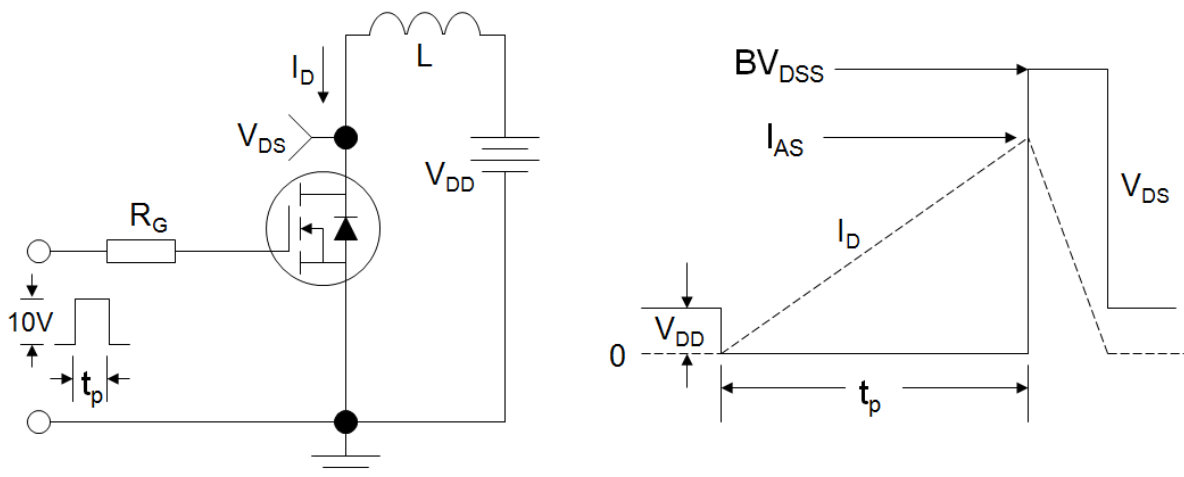
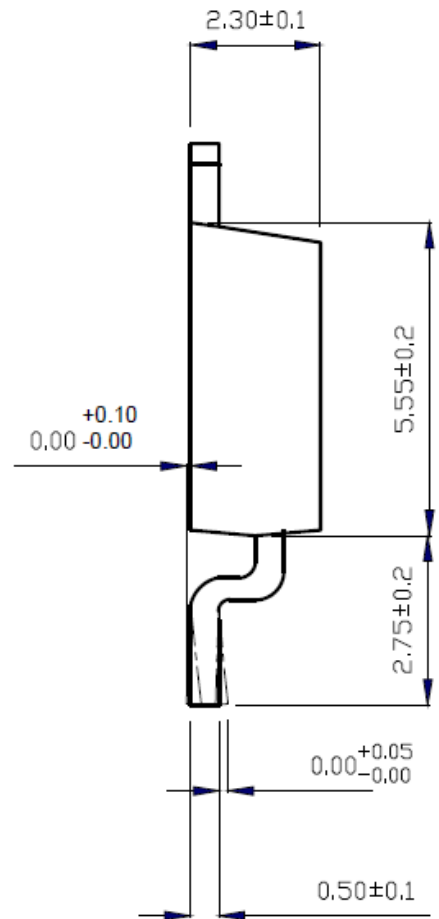
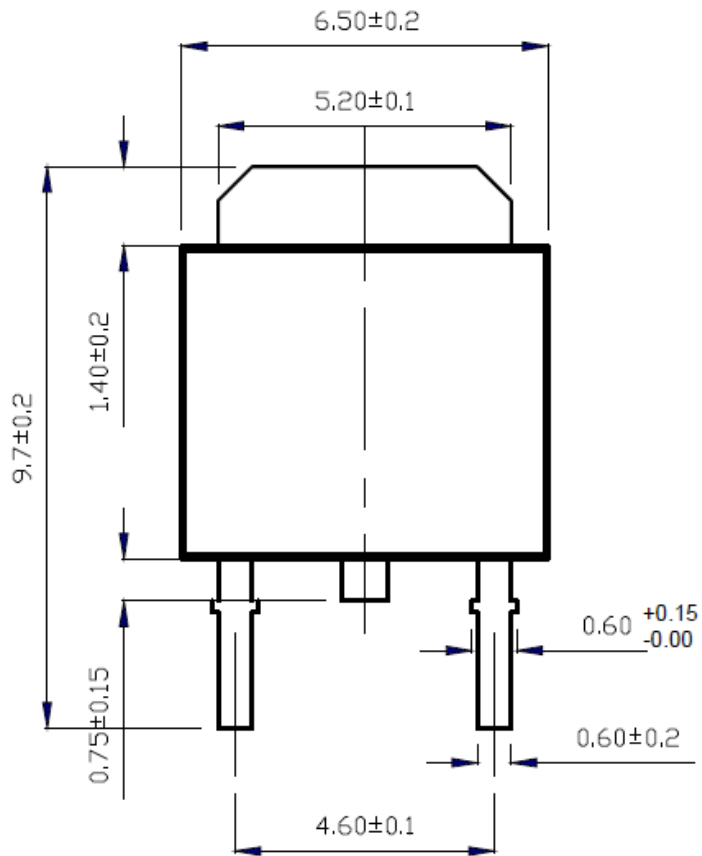


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



TO-252



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