IRF540N/NS

100V N-Channel MOSFET

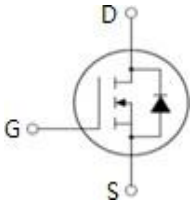
FEATURES

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

TO-263

APPLICATIONS

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



Device Marking and Package Information		
Device	**Package**	**Marking**
IRF540N	TO-220	IRF540N
IRF540NS	TO-263	IRF540NS

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted				
Parameter	**Symbol**	**Value**		**Unit**
		TO-220	TO-263	
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	100		V
Continuous Drain Current	I_D	33		A
Pulsed Drain Current (note1)	I_{DM}	120		A
Gate-Source Voltage	V_{GSS}	±20		V
Single Pulse Avalanche Energy (note2)	E_{AS}	335		mJ
Single Pulse Avalanche Current (note1)	I_{AS}	22		A
Repetitive Avalanche Energy (note1)	E_{AR}	201		mJ
Power Dissipation (T_C = 25ºC)	P_D	110		W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150		ºC

Thermal Resistance				
Parameter	**Symbol**	**Value**		**Unit**
		TO-220	TO-263	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.14		K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60		

Specifications T_J = 25ºC, 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 = 250μA	100	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 80V, V_{GS} = 0V, T_J = 125ºC	--	--	100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 15A	--	30	38	mΩ
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz	--	1331	--	pF
Output Capacitance	C_{oss}		--	276	--	
Reverse Transfer Capacitance	C_{rss}		--	88	--	
Total Gate Charge	Q_g	V_{DD} 80V, I_D = 30A, V_{GS} = 10V	--	53	--	nC
Gate-Source Charge	Q_{gs}		--	6	--	
Gate-Drain Charge	Q_{gd}		--	29	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 50V, I_D =10A, R_G = 25 Ω	--	39	--	ns
Turn-on Rise Time	t_r		--	45	--	
Turn-off Delay Time	$t_{d(off)}$		--	207	--	
Turn-off Fall Time	t_f		--	64	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25 ºC	--	--	33	A
Pulsed Diode Forward Current	I_{SM}		--	--	120	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 15A, V_{GS} = 0V	--	--	2	V
Reverse Recovery Time	t_{rr}	V_{GS} = 0V,I_S = 10A, di_F/dt =100A /μs	--	102	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.46	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=1mH, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25ºC
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics (T_J = 25ºC)

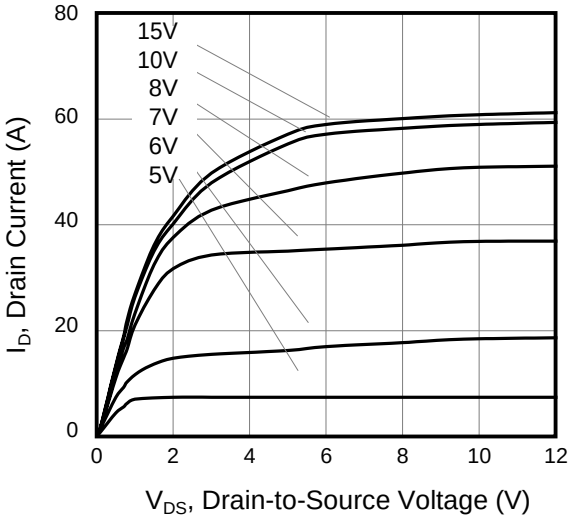


Figure 2. Body Diode Forward Voltage

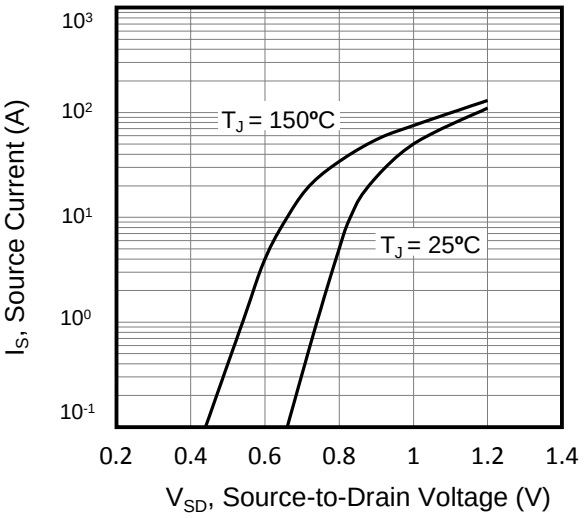


Figure 3. Drain Current vs. Temperature

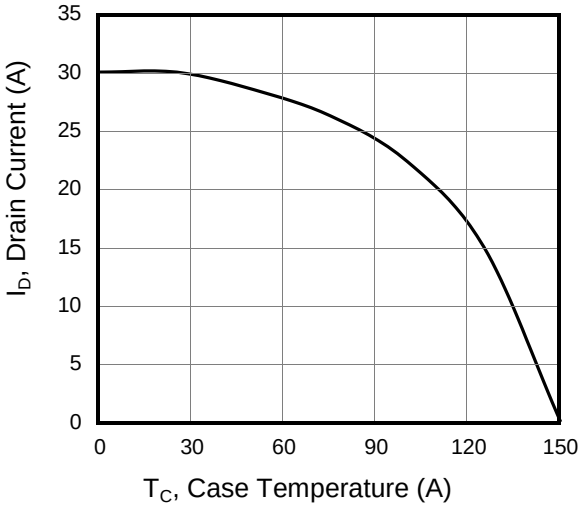


Figure 4. BV_{DSS} Variation vs. Temperature

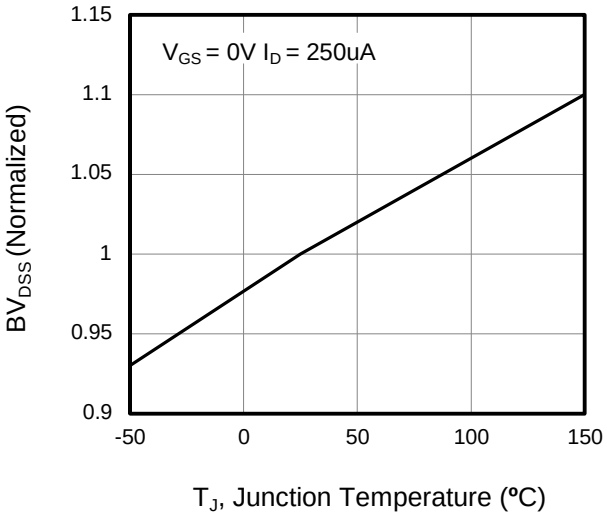


Figure 5. Transfer Characteristics

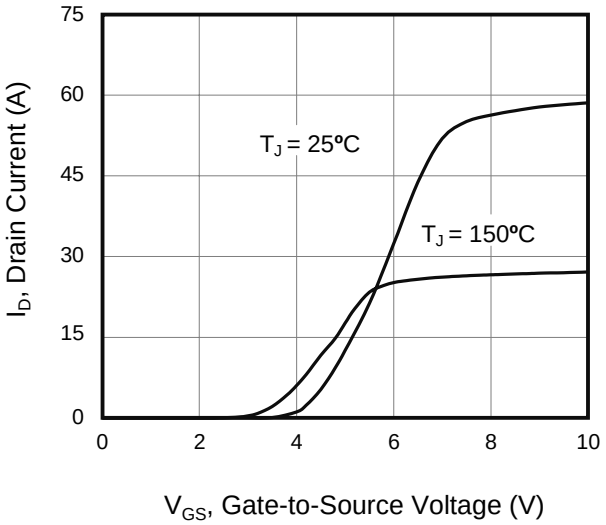
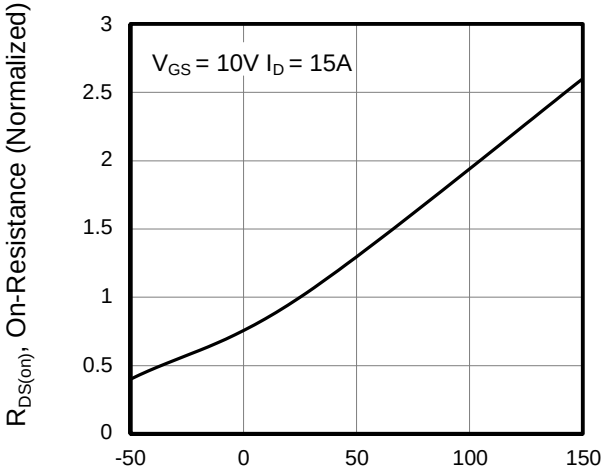


Figure 6. On-Resistance vs. Temperature



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Capacitance

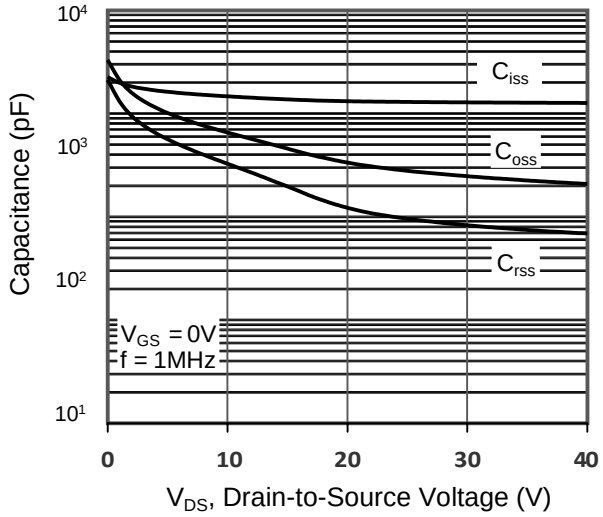


Figure 8. Gate Charge

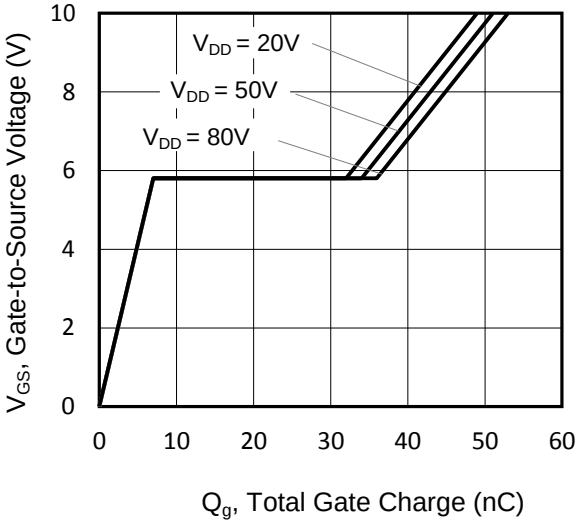


Figure 10. Transient Thermal Impedance TO-220,TO-263

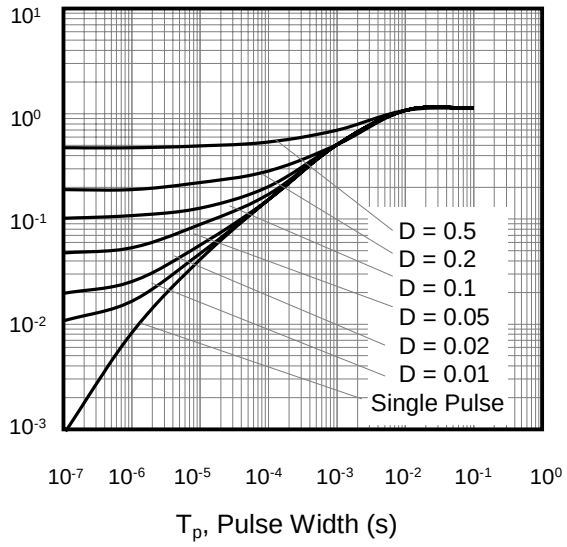


Figure A：Gate Charge Test Circuit and Waveform

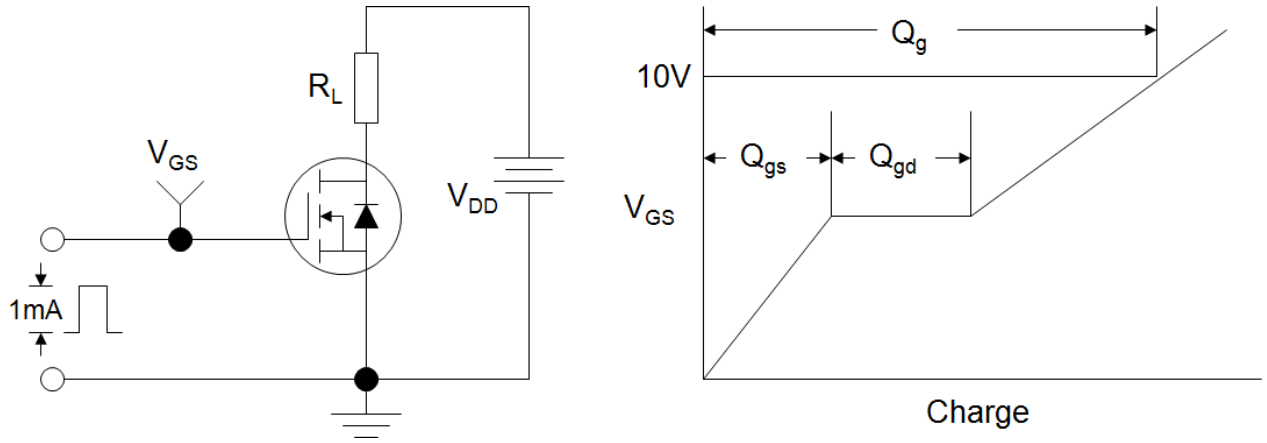


Figure B：Resistive Switching Test Circuit and Waveform

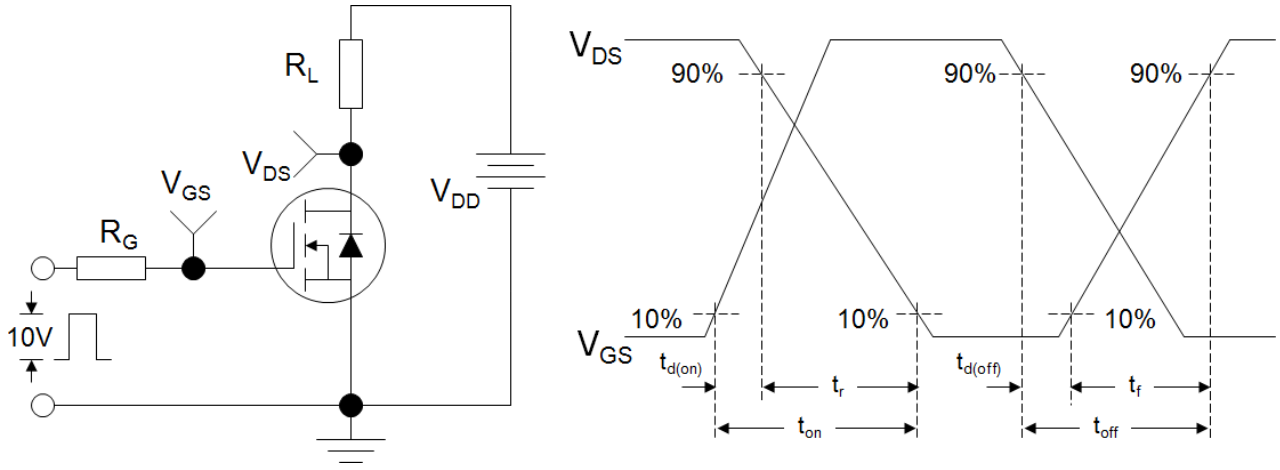


Figure C：Unclamped Inductive Switching Test Circuit and Waveform