

FEATURES

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

APPLICATIONS

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



Device Marking and Package Information		
Device	Package	Marking
IRF540NPBF	TO-220	IRF540N
IRF540NSTRPBF	TO-263	IRF540NS

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted				
Parameter	Symbol	Value		Unit
		TO-220	TO-263	
Drain-Source Voltage ($V_{GS} = 0\text{V}$)	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 ($T_C = 25^\circ\text{C}$)	P_D	110		W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	$-55 \sim +150$		$^\circ\text{C}$

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

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	100	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V, T_J = 25^{\circ}C$	--	--	1	μA
		$V_{DS} = 80V, V_{GS} = 0V, T_J = 125^{\circ}C$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20V$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	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	$t_{d(on)}$	$V_{DD} = 50V, I_D = 10A,$ $R_G = 25\Omega$	--	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	$T_C = 25^{\circ}C$	--	--	33	A
Pulsed Diode Forward Current	I_{SM}		--	--	120	
Body Diode Voltage	V_{SD}	$T_J = 25^{\circ}C, I_{SD} = 15A, V_{GS} = 0V$	--	--	2	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 10A,$ $di_F/dt = 100A/\mu s$	--	102	--	ns
Reverse Recovery Charge	Q_{rr}		--	0.46	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=1\text{mH}$, $V_{DD} = 50V$, $R_G = 25\Omega$, 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 ($T_J = 25^\circ\text{C}$)

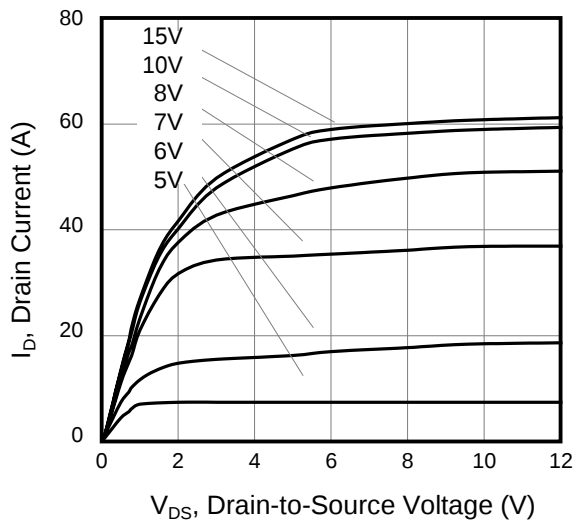


Figure 2. Body Diode Forward Voltage

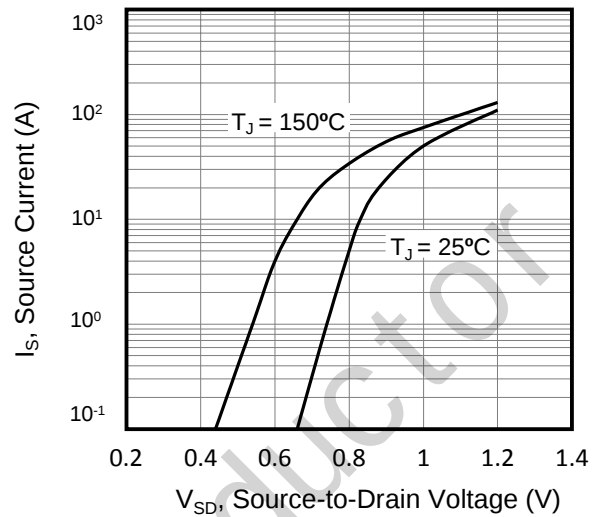


Figure 3. Drain Current vs. Temperature

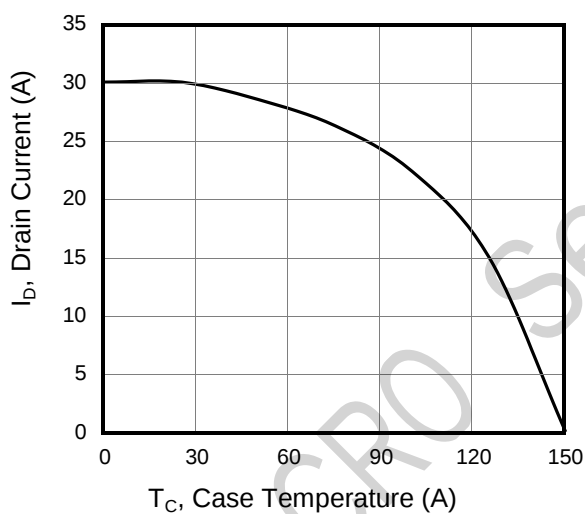


Figure 4. BV_{DSS} Variation vs. Temperature

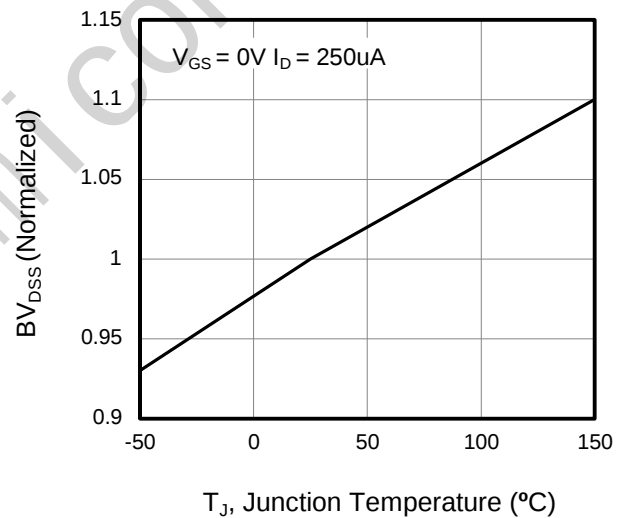


Figure 5. Transfer Characteristics

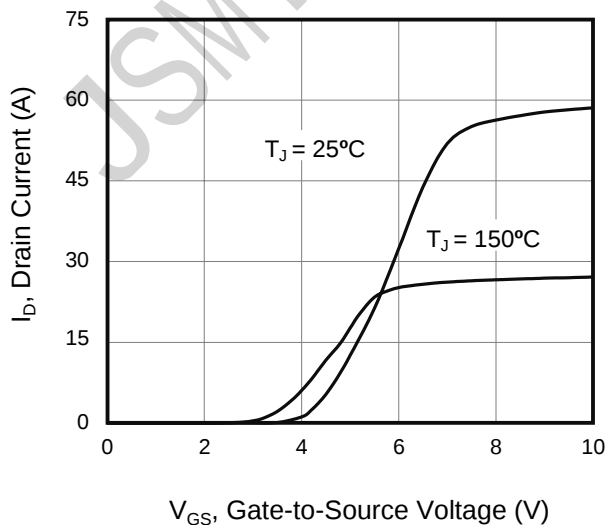
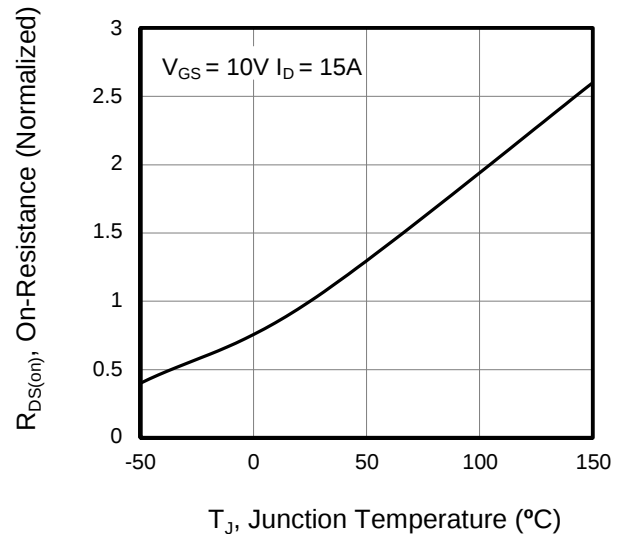


Figure 6. On-Resistance vs. Temperature



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

Figure 7. Capacitance

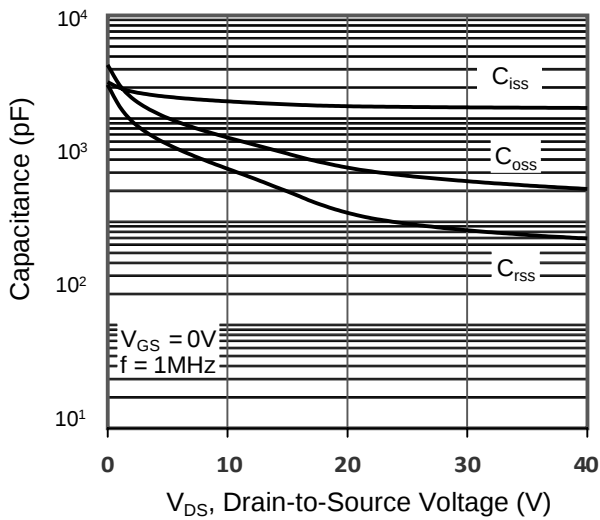


Figure 8. Gate Charge

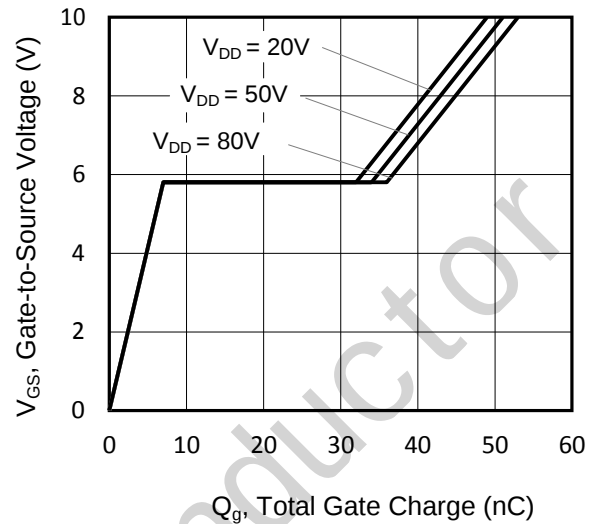


Figure 10. Transient Thermal Impedance
 TO-220, TO-263, TO-252

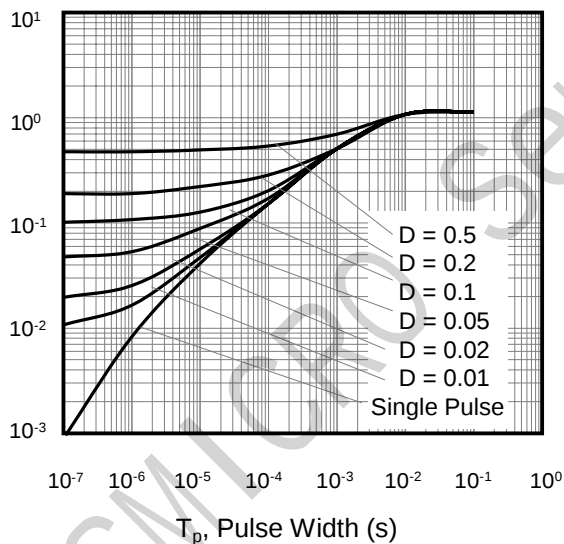


Figure A: Gate Charge Test Circuit and Waveform

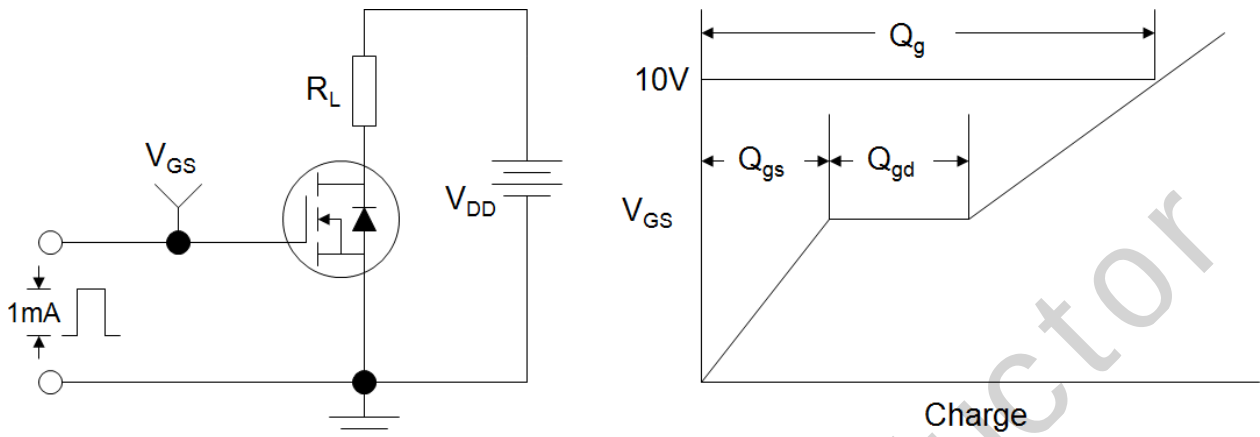


Figure B: Resistive Switching Test Circuit and Waveform

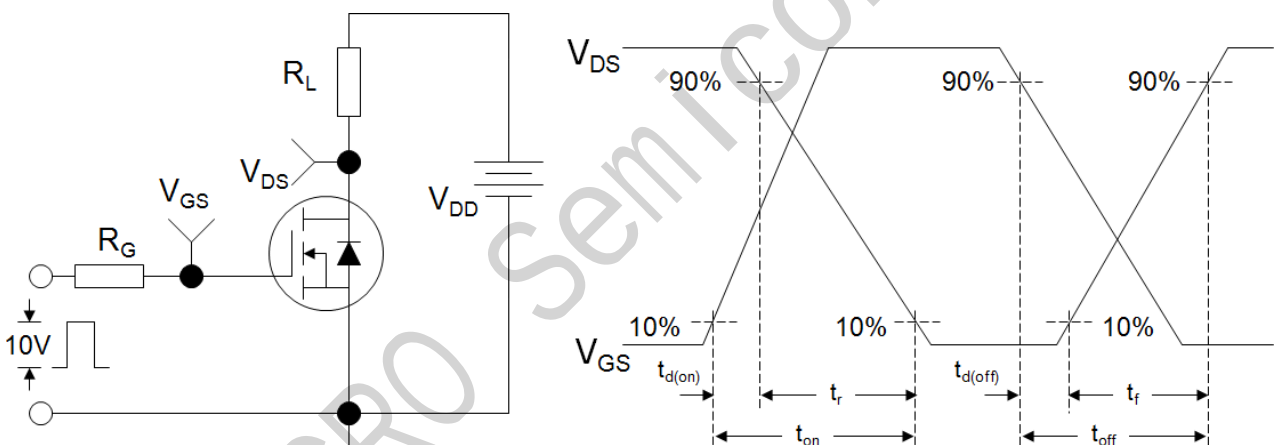


Figure C: Unclamped Inductive Switching Test Circuit and Waveform

