

ORDERING INFORMATION

Part Number	Package
IRF40N03	TO-220

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $T_J = 25^\circ\text{C}$.

		IRF40N03				
Characteristic	Symbol	Min	Typ	Max	Units	
OFF Characteristics						
Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$)	V_{DSS}	30			V	
Breakdown Voltage Temperature Coefficient (Reference to 25°C , $I_D = 1\text{ mA}$)	$\Delta V_{DSS}/\Delta T_J$		0.037		$\text{V}/^\circ\text{C}$	
Drain-to-Source Leakage Current ($V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 25^\circ\text{C}$) ($V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 150^\circ\text{C}$)	I_{DSS}			1 25	μA	
Gate-to-Source Forward Leakage ($V_{GS} = 20\text{ V}$)	I_{GSS}			100	nA	
Gate-to-Source Reverse Leakage ($V_{GS} = -20\text{ V}$)	I_{GSS}			-100	nA	
ON Characteristics						
Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$)	$V_{GS(th)}$	1.0	2.0	3.0	V	
Static Drain-to-Source On-Resistance (Note 4) ($V_{GS} = 10\text{ V}$, $I_D = 20\text{ A}$)	$R_{DS(on)}$		14	17	m Ω	
Forward Transconductance ($V_{DS} = 10\text{ V}$, $I_D = 20\text{ A}$) (Note 4)	g_{FS}		26		S	
Dynamic Characteristics						
Input Capacitance	$(V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$)	C_{iss}		800	pF	
Output Capacitance		C_{oss}		380	pF	
Reverse Transfer Capacitance		C_{rss}		133	pF	
Total Gate Charge ($V_{GS} = 10\text{ V}$)	$(V_{DS} = 24\text{ V}$, $I_D = 20\text{ A}$, $V_{GS} = 5\text{ V}$) (Note 5)	Q_g		17	nC	
Gate-to-Source Charge		Q_{gs}		3	nC	
Gate-to-Drain ("Miller") Charge		Q_{gd}		10	nC	
Resistive Switching Characteristics						
Turn-On Delay Time	$(V_{DS} = 15\text{ V}$, $I_D = 20\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 3.3\ \Omega$) (Note 5)	$t_{d(on)}$		7.2	ns	
Rise Time		t_{rise}		60	ns	
Turn-Off Delay Time		$t_{d(off)}$		22.5	ns	
Fall Time		t_{fall}		10	ns	
Source-Drain Diode Characteristics						
Continuous Source Current (Body Diode)	Integral pn-diode in MOSFET	I_S			40	A
Pulse Source Current (Body Diode)		I_{SM}			170	A
Diode Forward On-Voltage ($I_S = 40\text{ A}$, $V_{GS} = 0\text{ V}$)		V_{SD}		1.3	V	
Reverse Recovery Time ($I_F = 40\text{ A}$, $V_{GS} = 0\text{ V}$,		t_{rr}		55	ns	
Reverse Recovery Charge $di/dt = 100\text{ A}/\mu\text{s}$)		Q_{rr}		110	nC	

Note 1: $T_J = +25^\circ\text{C}$ to 150°C

Note 2: Repetitive rating; pulse width limited by maximum junction temperature.

Note 3: $I_{SD} = 12.0\text{ A}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, $T_J = +150^\circ\text{C}$

Note 4: Pulse width $\leq 250\ \mu\text{s}$; duty cycle $\leq 2\%$

Note 5: Essentially independent of operating temperature.

TYPICAL ELECTRICAL CHARACTERISTICS

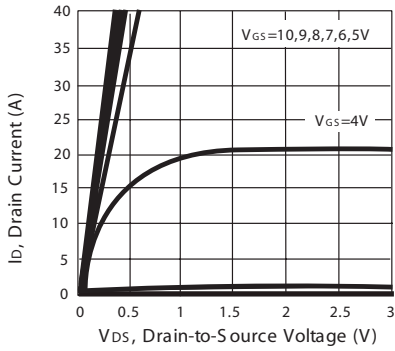


Figure 1. Output Characteristics

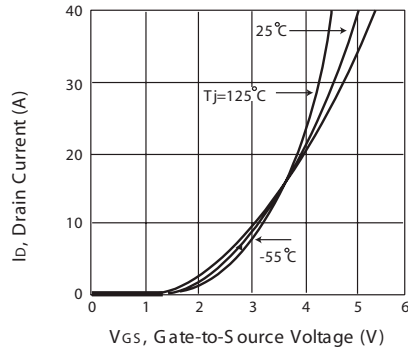


Figure 2. Transfer Characteristics

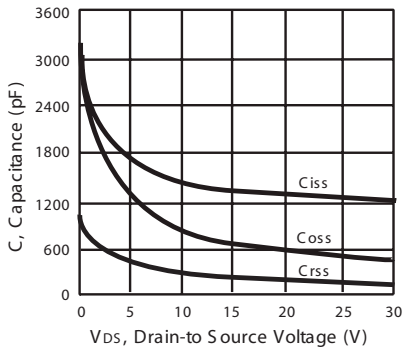


Figure 3. Capacitance

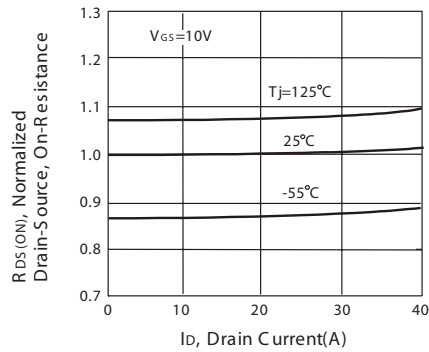


Figure 4. On-Resistance Variation with Drain Current and Temperature

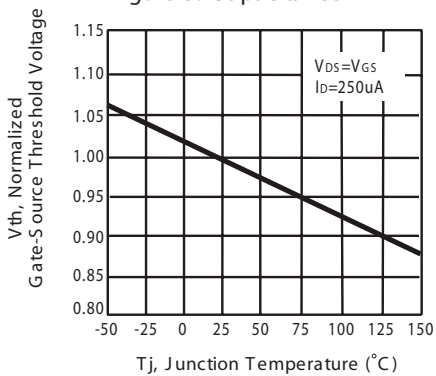


Figure 5. Gate Threshold Variation with Temperature

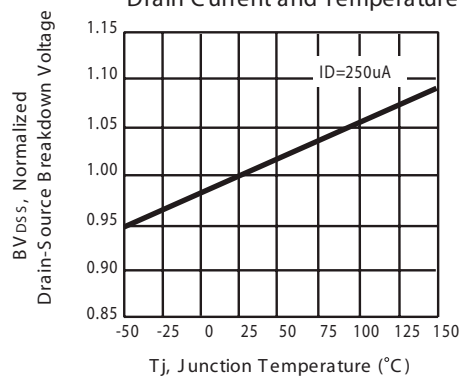


Figure 6. Breakdown Voltage Variation with Temperature

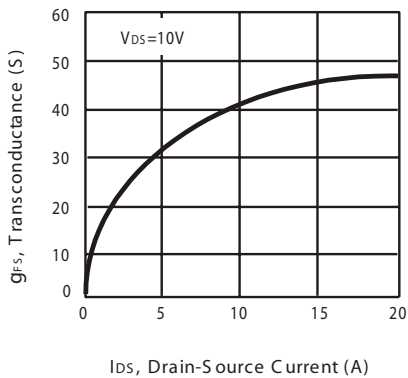


Figure 7. Transconductance Variation with Drain Current

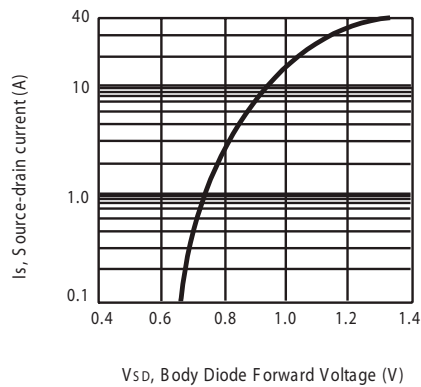


Figure 8. Body Diode Forward Voltage Variation with Source Current

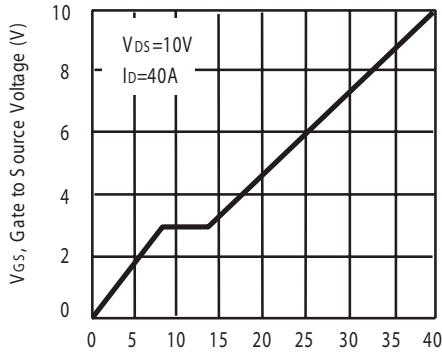


Figure 9. Gate Charge

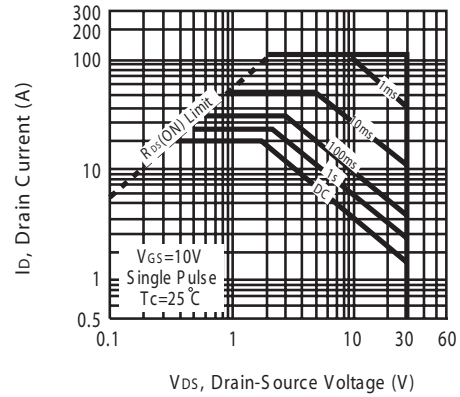


Figure 10. Maximum Safe Operating Area

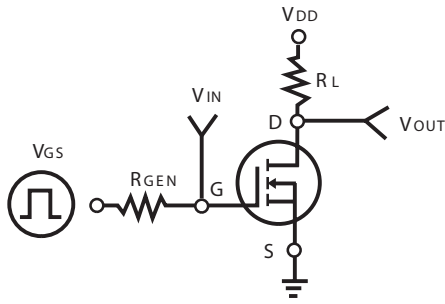


Figure 11. Switching Test Circuit

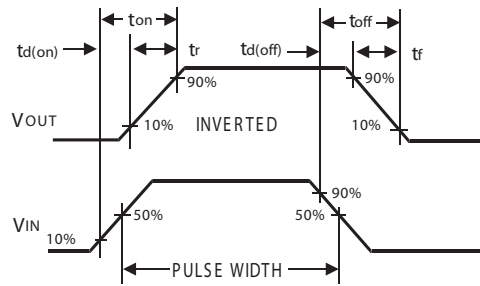


Figure 12. Switching Waveforms

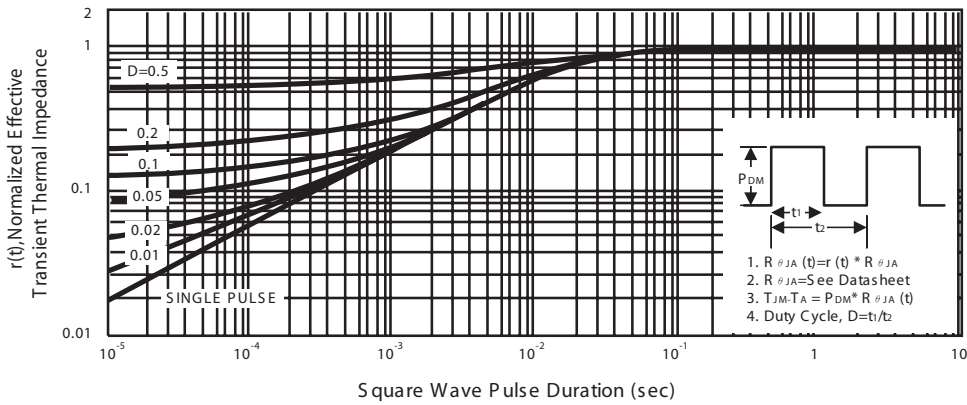


Figure 13. Normalized Thermal Transient Impedance Curve