

IRFD210, IRFD213

N-Channel Enhancement Mode Transistors

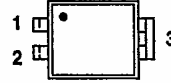
T-39-05

4-PIN DIP
(Similar to TO-250)

TOP VIEW

PRODUCT SUMMARY

PART NUMBER	$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
IRFD210	200	1.5	0.60
IRFD213	150	2.4	0.45



1 GATE
2 SOURCE
3 DRAIN

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS	SYMBOL	LIMITS		UNITS
		IRFD210	IRFD213	
Drain-Source Voltage	V_{DS}	200	150	V
Gate-Source Voltage	V_{GS}	± 20	± 20	
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_D	0.60	A
	$T_A = 100^\circ\text{C}$		0.4	
Pulsed Drain Current ¹	I_{DM}	2.5	1.8	
Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	1.0	W
	$T_A = 100^\circ\text{C}$		0.4	
Operating Junction & Storage Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$
Lead Temperature ($1/16"$ from case for 10 sec.)	T_L	300		

4

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient	R_{thJA}		120	K/W

¹Pulse width limited by maximum junction temperature.

IRFD210, IRFD213



ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

T-39-05

PARAMETER		SYMBOL	TEST CONDITIONS	TYP	LIMITS		UNIT
					MIN	MAX	
STATIC							
Drain-Source Breakdown Voltage	IRFD210 IRFD213	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		200 150		V
Gate Threshold Voltage		$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		2.0	4.0	
Gate-Body Leakage		I_{GBS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 500	nA
Zero Gate Voltage Drain Current		I_{DSS}	$V_{DS} = V_{(BR)DSS}, V_{GS} = 0\text{ V}$			250	μA
			$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			1000	
On-State Drain Current ¹	IRFD210 IRFD213	$I_{D(ON)}$	$V_{DS} = 1\text{ V}, V_{GS} = 10\text{ V}$		0.60 0.45		A
Drain-Source On-State Resistance ¹	IRFD210 IRFD213	$r_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 0.3\text{ A}$	1.0 1.5		1.5 2.4	Ω
	IRFD210 IRFD213		$V_{GS} = 10\text{ V}, I_D = 0.3\text{ A}, T_J = 125^\circ\text{C}$	1.8 2.7		2.7 4.3	
Forward Transconductance ¹		g_{fs}	$V_{DS} = 15\text{ V}, I_D = 0.3\text{ A}$	0.6	0.5		S
DYNAMIC							
Input Capacitance		C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	175		200	pF
Output Capacitance		C_{oss}		70		80	
Reverse Transfer Capacitance		C_{rss}		15		25	
Total Gate Charge ²		Q_g	$V_{DS} = 0.8 \times V_{(BR)DSS}, V_{GS} = 10\text{ V}, I_D = 0.3\text{ A}$	7.5		9.0	nC
Gate-Source Charge ²		Q_{gs}		1.6			
Gate-Drain Charge ²		Q_{gd}		5.0			
Turn-On Delay Time ²		$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 330\text{ }\Omega$ $I_D \simeq 0.3\text{ A}, V_{GEN} = 10\text{ V}, R_G = 50\text{ }\Omega$	7		15	ns
Rise Time ²		t_r		16		25	
Turn-Off Delay Time ²		$t_{d(off)}$		35		45	
Fall Time ²		t_f		20		30	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_A = 25^\circ\text{C}$)							
Continuous Current	IRFD210 IRFD213	I_S				0.60 0.45	A
Pulsed Current ³	IRFD210 IRFD213	I_{SM}				2.5 1.8	
Forward Voltage ¹	IRFD210 IRFD213	V_{SD}	$I_F = I_S, V_{GS} = 0\text{ V}$	1.5 1.4		2.0 1.8	V
Reverse Recovery Time		t_{rr}	$I_F = I_S, dI_F/dt = 100\text{ A}/\mu\text{s}$	65			ns
Reverse Recovery Charge		Q_{rr}		0.12			μC

¹Pulse test: Pulse Width $\leq 300\text{ }\mu\text{sec}$, Duty Cycle $\leq 2\%$.

²Independent of operating temperature.

³Pulse width limited by maximum junction temperature).

Figure 1. Output Characteristics

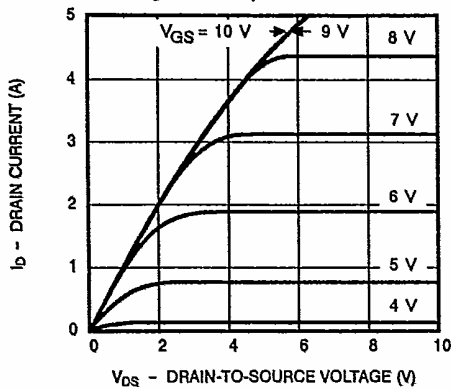


Figure 2. Transfer Characteristics

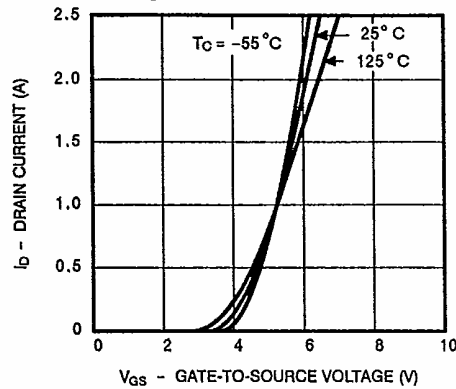


Figure 3. Transconductance

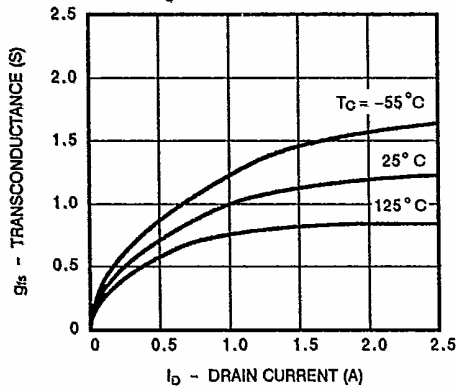


Figure 4. On-Resistance

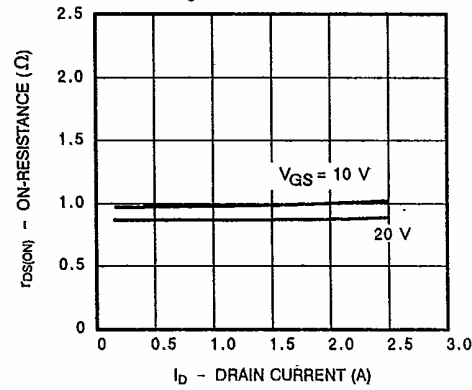


Figure 5. Capacitance

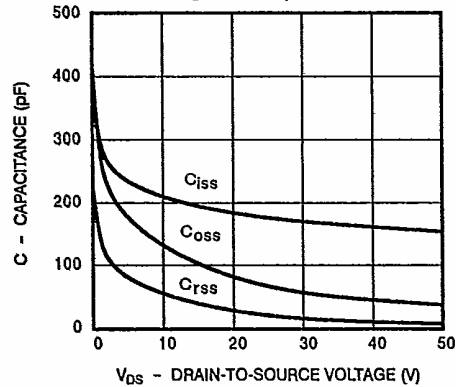
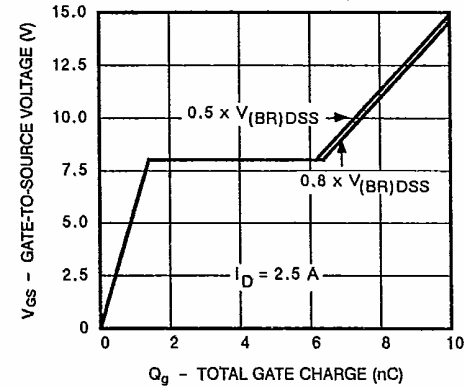


Figure 6. Gate Charge



IRFD210, IRFD213



TYPICAL CHARACTERISTICS (Cont'd)

T-39-05

Figure 7. On-Resistance vs. Junction Temperature

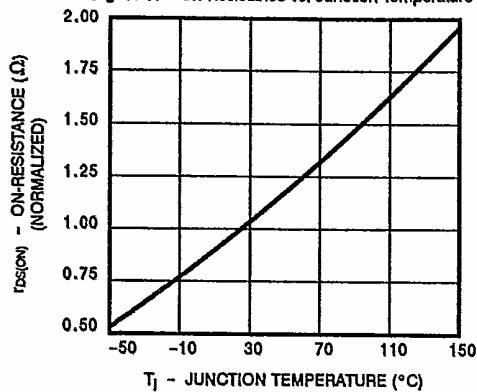
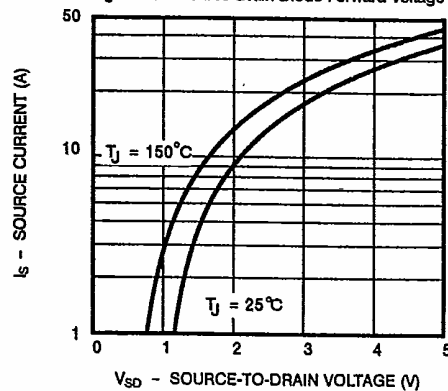


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

Figure 9. Maximum Drain Current vs. Case Temperature

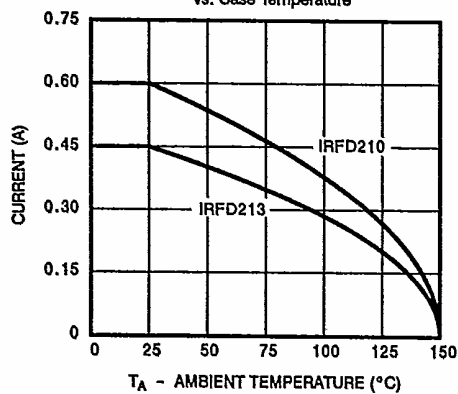


Figure 10. Safe Operating Area

