

RoHS  
Compliant



## Features

- $V_{DS(V)} = 100V$
- $I_D = -38A$
- $R_{DS(ON)} < 60m\Omega @ V_{GS} = -10V$
- Ultra Low On-Resistance
- Fast Switching
- Advanced Process Technology

## Absolute Maximum Ratings ( $T_C = 25^\circ C$ ) Unless otherwise noted

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	-100	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current, $V_{GS} @ -10V$	$I_D$	$T_C = 25^\circ C$	-38	A
		$T_C = 100^\circ C$	-24	
Pulsed Drain Current	Note 1	$I_{DM}$	-140	
Single Pulse Avalanche Energy	Note 2	$E_{AS}$	120	mJ
Avalanche Current	Note 1	$I_{AR}$	-23	A
Repetitive Avalanche Energy	Note 1	$E_{AR}$	17	mJ
Peak Diode Recovery $dv/dt$	Note 3	$dv/dt$	-7.4	V/ns
Maximum Power Dissipation		$T_A = 25^\circ C$	3.1	W
		$T_C = 25^\circ C$	170	
Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	0.75	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	Note 5	$R_{\theta JA}$	40	
Operating Junction and Storage Temperature Range		$R_{thJC}$	-55 to + 150	$^\circ C$

## Electrical Characteristics $T_a = 25^\circ C$

Characteristic	Symbol	Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A,$	-100			V
Breakdown Voltage Temp. Coefficient	$I_{DSS}/\Delta T_J$	Reference to $25^\circ C, I_D = -1mA$		-0.11	-1	$^\circ C$
Static Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = -38A$ (Note 4)			60	$m\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-2		-4	V
Forward Transconductance	$g_{FS}$	$V_{DS} = -50V, I_D = -23A$	9.5			S
Drain-to-Source Leakage Current	$I_{DSS}$	$V_{DS} = -100V, V_{GS} = 0V$			-50	$\mu A$
		$V_{DS} = -80V, V_{GS} = 0V, T_J = 125^\circ C$			-250	

Characteristic	Symbol	Conditions	Min	Typ	Max	Unit
Gate-to-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$			$\pm 100$	nA
Total Gate Charge	$Q_g$	$I_D = -23A, V_{DS} = -80V,$ $V_{GS} = -10V$ (Note 4)		150	230	nC
Gate-to-Source Charge	$Q_{gs}$			22	33	
Gate-to-Drain ("Miller") Charge	$Q_{gd}$			81	120	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -50V, I_D = -23A,$ $R_G = 2.4\Omega, V_{GS} = -10V$ (Note 4)		14		nS
Rise Time	$t_r$			63		
Turn-Off Delay Time	$t_{d(off)}$			72		
Fall Time	$t_f$			55		
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V, f=1MHz$		2780		pF
Output Capacitance	$C_{oss}$			800		
Reverse Transfer Capacitance	$C_{rss}$			430		
Source-Drain Ratings and Characteristics						
Continuous Source Current	$I_S$				-38	A
Pulsed Source Current	$I_{SM}$				-140	
Diode Forward Voltage	$V_{SD}$	$I_S=-23A, V_{GS}=0V$ (Note 4)			-1.6	V
Reverse Recovery Time	$t_{rr}$	$I_F = -23A, V_{DD} = -25V,$ $di/dt = -100A/\mu s$ (Note 4)			260	nS
Reverse Recovery Charge	$Q_{rr}$				1770	nC

## NOTES:

1. Repetitive rating: pulse width limited by max. junction temperature.
2. Starting  $T_J=25^\circ C$ ,  $L=0.46mH$ ,  $R_G=25\Omega$ ,  $I_{AS}=-23A$ .
3.  $I_{SD}\leq -23A$ ,  $di/dt\leq -650A/\mu s$ ,  $V_{DD}\leq V_{(BR)DSS}$ ,  $T_J\leq 150^\circ C$ .
4. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
5. When mounted on 1" square FR-4 PCB.

## Typical Characteristics

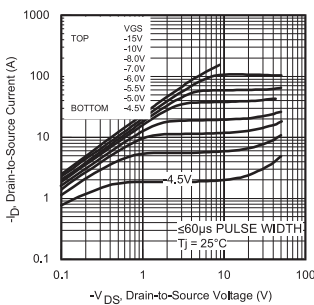


Fig 1. Typical Output Characteristics

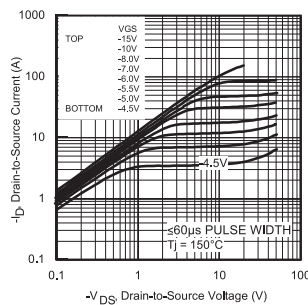


Fig 2. Typical Output Characteristics

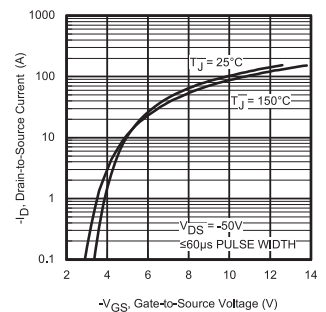
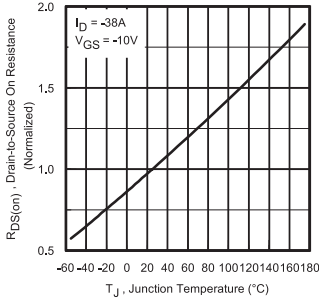
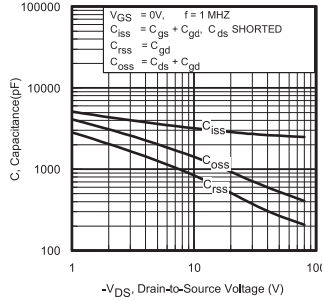


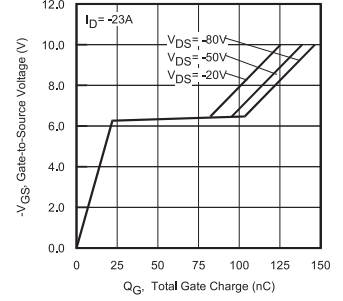
Fig 3. Typical Transfer Characteristics



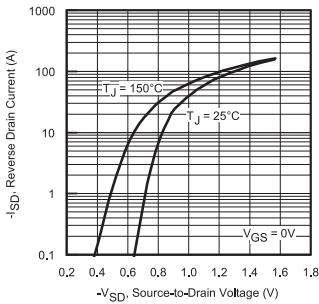
**Fig 4.** Normalized On-Resistance vs. Temperature



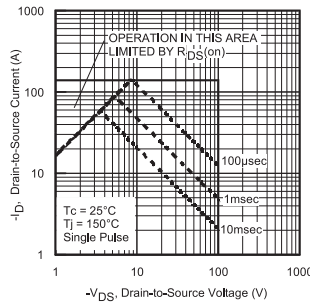
**Fig 5.** Typical Capacitance vs. Drain-to-Source Voltage



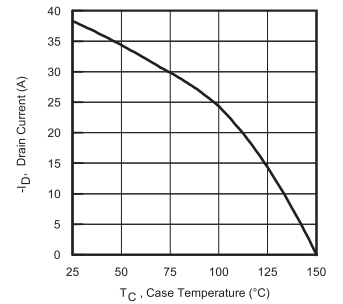
**Fig 6.** Typical Gate Charge vs. Gate-to-Source Voltage



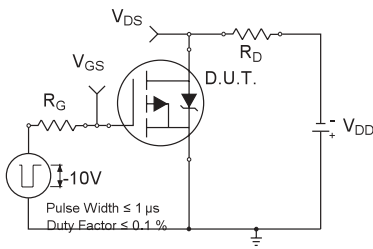
**Fig 7.** Typical Source-Drain Diode Forward Voltage



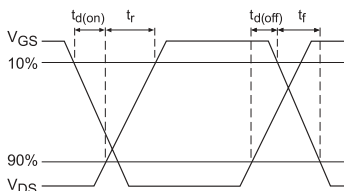
**Fig 8.** Maximum Safe Operating Area



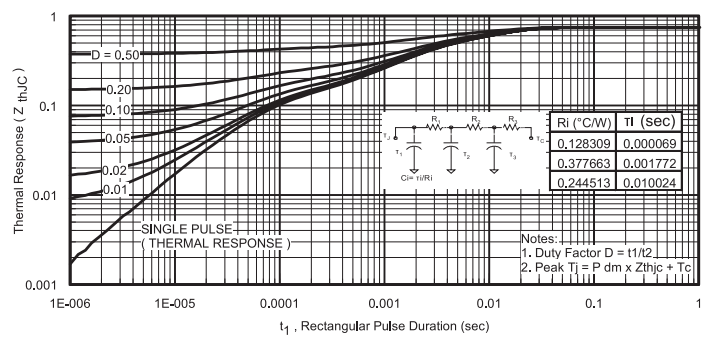
**Fig 9.** Maximum Drain Current vs. Case Temperature



**Fig 10a.** Switching Time Test Circuit

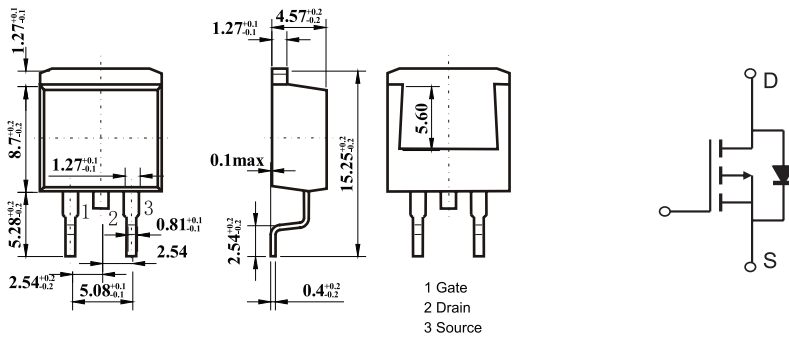


**Fig 10b.** Switching Time Waveforms



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

## Diagram



## Part Number Table

Description	Part Number
P Channel MOSFET, -38A, 100V, TO263	IRF5210S

Dimensions : Millimetres

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