

# N Channel MOSFET

multicomp **PRO**

RoHS  
Compliant



## Features

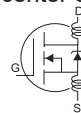
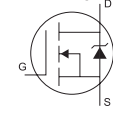
- $V_{DS(V)} = 100V$
- $I_D = 33A$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 44m\Omega$  ( $V_{GS} = 10V$ )
- Fast Switching

## Absolute Maximum Ratings ( $T_a = 25^\circ C$ )

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	100	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current	$I_D$	$T_a = 25^\circ C$	33	A
		$T_a = 70^\circ C$	23	
Pulsed Drain Current	$I_{DM}$	110		
Avalanche Current	$I_{AR}$	16	A	
Repetitive Avalanche Energy	$E_{AR}$	13	mJ	
Peak Diode Recovery dv/dt	dv/dt	7	V/ns	
Power Dissipation	$T_C = 25^\circ C$ $P_D$	130	W	
Linear Derating Factor		0.87		
Thermal Resistance. Junction- to-Ambient	$R_{THJA}$	40	$^\circ C/W$	
Thermal Resistance. Junction- to-Case	$R_{THJC}$	1.15		
Junction Temperature	$T_J$	175		
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	$V_{DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100V, V_{GS} = 0V$			25	uA
		$V_{DS} = 80V, V_{GS} = 0V, T_J = 150^\circ C$			250	
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS} = 0V, V_{GS} = \pm 20V$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2		4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 16A$ (Note.1)			44	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 50V, I_D = 16A$ (Note.1)	21			S

Characteristic	Symbol	Conditions	Min	Typ	Max	Unit
Input Capacitance	$C_{iss}$	$V_{GS}=0V, V_{DS}=25V, f=1MHz$		1960		pF
Output Capacitance	$C_{oss}$			250		
Reverse Transfer Capacitance	$C_{rss}$			40		
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=80V, I_D=16A$ (Note 1)			71	nC
Gate Source Charge	$Q_{gs}$				14	
Gate Drain Charge	$Q_{gd}$				21	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V, V_{DS}=50V, I_D=16A, R_G=5.1\Omega$		11		nS
Turn-On Rise Time	$t_r$			35		
Turn-Off Delay Time	$t_{d(off)}$			39		
Turn-Off Fall Time	$t_f$			35		
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=16A, di/dt=100A/\mu s, T_J=25^\circ C$		115	170	nS
Body Diode Reverse Recovery Charge	$Q_{rr}$			505	760	
Internal Drain Inductance	$L_D$	Between lead, 6mm (0.25in.) from package and center of die contact 		4.5		nH
Internal Source Inductance	$L_S$			7.5		
Single Pulse Avalanche Energy	$E_{AS}$	$I_{AS}=16A, L=1.5mH$			185	mJ
Maximum Body-Diode Continuous Current	$I_S$	MOSFET symbol showing the integral reverse p-n junction diode. 			33	A
Pulsed Source Current	$I_{SM}$				110	
Diode Forward Voltage	$V_{SD}$	$I_S=16A, V_{GS}=0V, T_J=25^\circ C$			1.2	V

Note.1: Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .

## Typical Characteristics

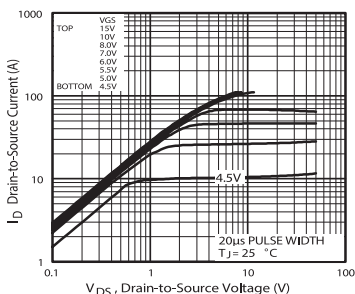


Fig 1. Typical Output Characteristics

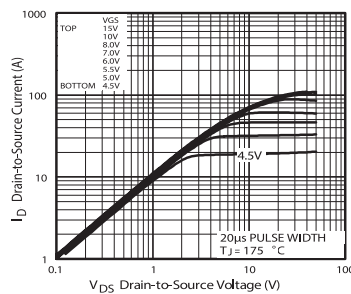


Fig 2. Typical Output Characteristics

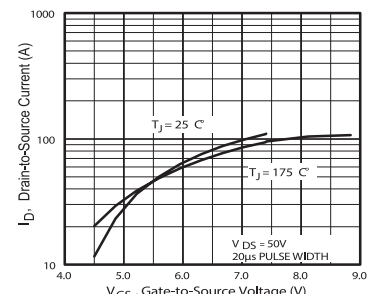


Fig 3. Typical Transfer Characteristics

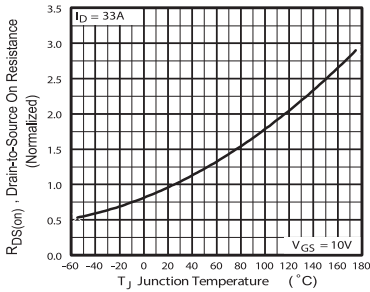


Fig 4. Normalized On-Resistance Vs. Temperature

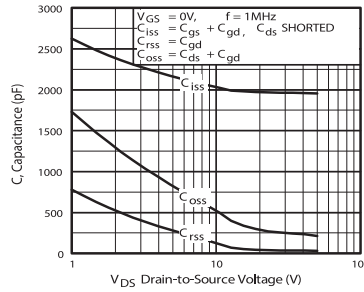


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

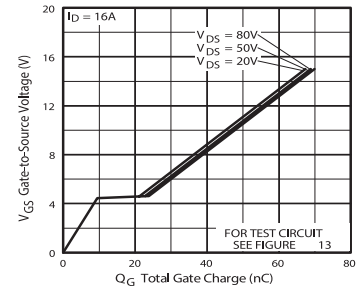


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

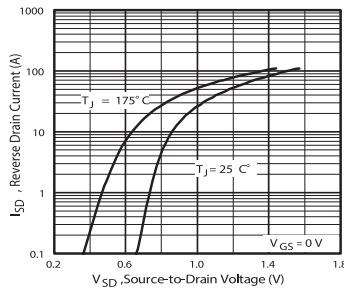


Fig 7. Typical Source-Drain Diode Forward Voltage

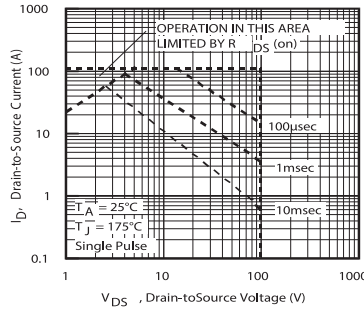


Fig 8. Maximum Safe Operating Area

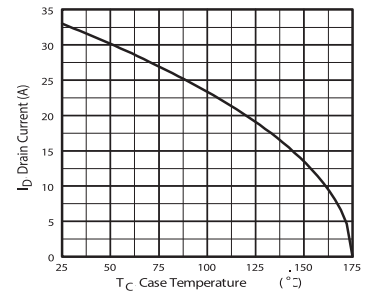


Fig 9. Maximum Drain Current Vs. Case Temperature

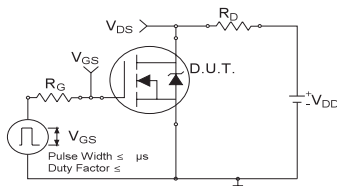


Fig 10a. Switching Time Test Circuit

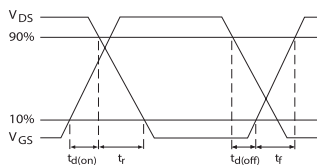


Fig 10b. Switching Time Waveforms

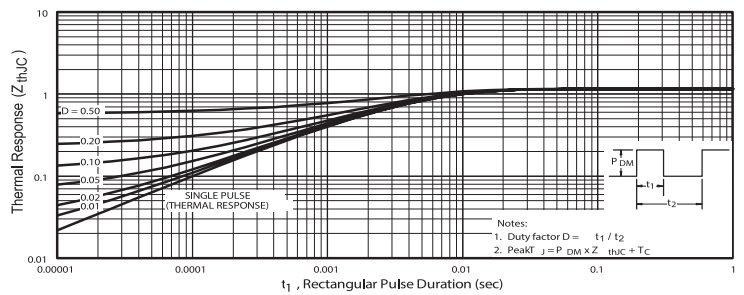
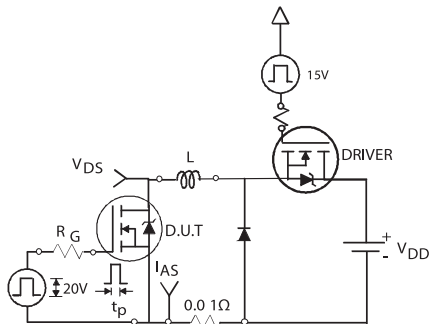
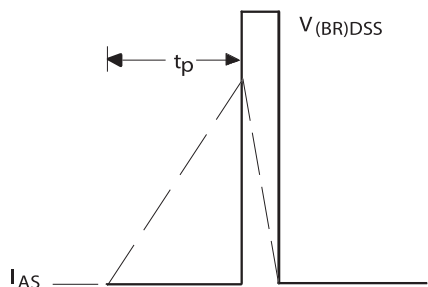


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

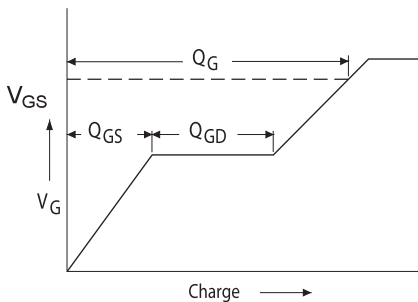
## Typical Characteristics



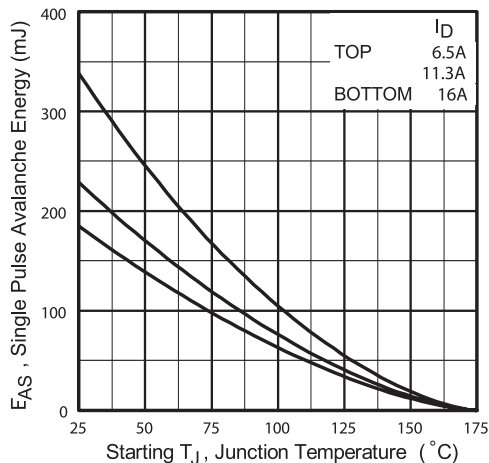
**Fig 12a.** Unclamped Inductive Test Circuit



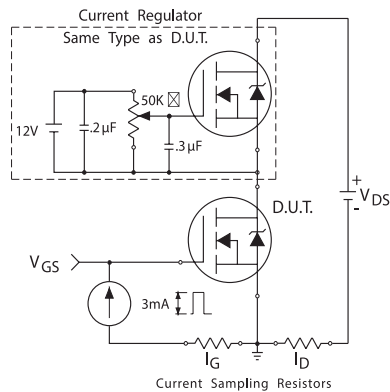
**Fig 12b.** Unclamped Inductive Waveforms



**Fig 13a.** Basic Gate Charge Waveform



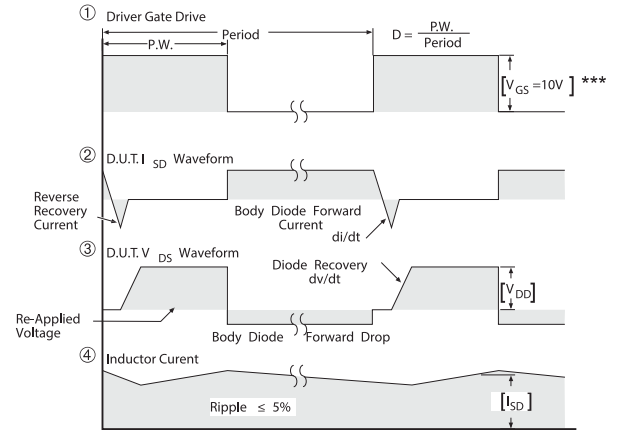
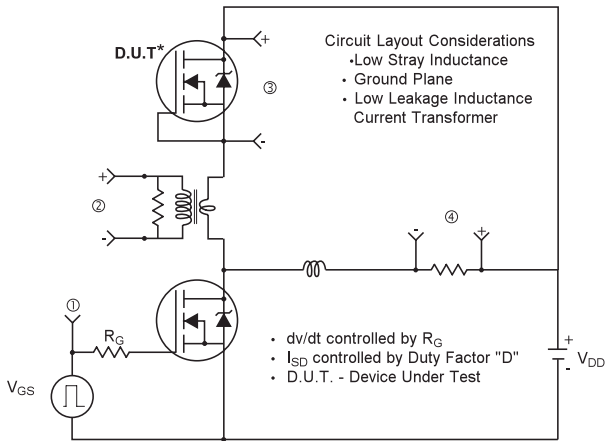
**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current



**Fig 13b.** Gate Charge Test Circuit

## Typical Characteristics

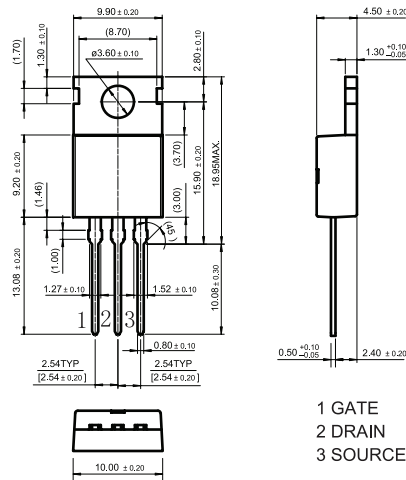
Peak Diode Recovery dv/dt Test Circuit



\*\*\*  $V_{GS} = 5.0V$  for Logic Level and 3V Drive Devices

Fig 14. For N-channel HEXFET® power MOSFETs

## Diagram



## Part Number Table

Description	Part Number
N Channel MOSFET, 33A, 100V TO220	IRF540N

Dimensions : Millimetres

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