



# POWER-MOS FET

## FIELD EFFECT POWER TRANSISTOR

**IRF542,543**

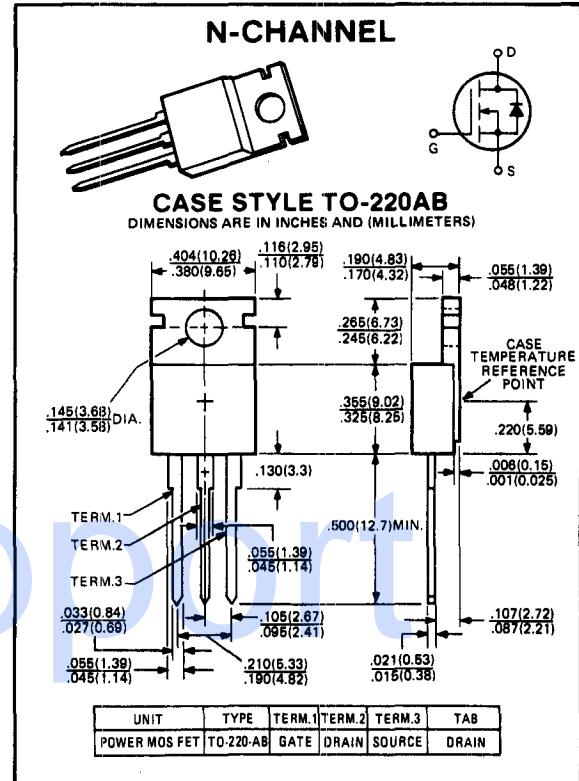
24 AMPERES  
100, 60 VOLTS  
 $R_{DS(ON)} = 0.11 \Omega$

This series of N-Channel Enhancement-mode Power MOSFETs utilizes GE's advanced Power DMOS technology to achieve low on-resistance with excellent device ruggedness and reliability.

This design has been optimized to give superior performance in most switching applications including: switching power supplies, inverters, converters and solenoid/relay drivers. Also, the extended safe operating area with good linear transfer characteristics makes it well suited for many linear applications such as audio amplifiers and servo motors.

### Features

- Polysilicon gate — Improved stability and reliability
- No secondary breakdown — Excellent ruggedness
- Ultra-fast switching — Independent of temperature
- Voltage controlled — High transconductance
- Low input capacitance — Reduced drive requirement
- Excellent thermal stability — Ease of paralleling



maximum ratings ( $T_C = 25^\circ C$ ) (unless otherwise specified)

RATING	SYMBOL	IRF542	IRF543	UNITS
Drain-Source Voltage	$V_{DSS}$	100	60	Volts
Drain-Gate Voltage, $R_{GS} = 1M\Omega$	$V_{DGR}$	100	60	Volts
Continuous Drain Current @ $T_C = 25^\circ C$ @ $T_C = 100^\circ C$	$I_D$	24 15	24 15	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	96	96	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	Volts
Total Power Dissipation @ $T_C = 25^\circ C$ Derate Above $25^\circ C$	$P_D$	125 1.0	125 1.0	Watts $W/\text{ }^\circ C$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	-55 to 150	-55 to 150	$^\circ C$

### thermal characteristics

Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.00	1.00	$^\circ C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	80	80	$^\circ C/W$
Maximum Lead Temperature for Soldering Purposes: $1/8''$ from Case for 5 Seconds	$T_L$	260	260	$^\circ C$

(1) Repetitive Rating: Pulse width limited by max. junction temperature.

# electrical characteristics ( $T_C = 25^\circ C$ ) (unless otherwise specified)

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
<b>off characteristics</b>					
Drain-Source Breakdown Voltage ( $V_{GS} = 0V$ , $I_D = 250 \mu A$ )	IRF542 IRF543	$BV_{DSS}$	100 60	—	Volts
Zero Gate Voltage Drain Current ( $V_{DS} = \text{Max Rating}$ , $V_{GS} = 0V$ , $T_C = 25^\circ C$ ) ( $V_{DS} = \text{Max Rating} \times 0.8$ , $V_{GS} = 0V$ , $T_C = 125^\circ C$ )	$I_{DSS}$	—	—	250 1000	$\mu A$
Gate-Source Leakage Current ( $V_{GS} = \pm 20V$ )	$I_{GSS}$	—	—	$\pm 500$	nA

## on characteristics\*

Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 250 \mu A$ )	$T_C = 25^\circ C$	$V_{GS(TH)}$	2.0	—	4.0	Volts
On-State Drain Current ( $V_{GS} = 10V$ , $V_{DS} = 10V$ )		$I_{D(ON)}$	24	—	—	A
Static Drain-Source On-State Resistance ( $V_{GS} = 10V$ , $I_D = 15A$ )		$R_{DS(ON)}$	—	0.09	0.11	Ohms
Forward Transconductance ( $V_{DS} = 10V$ , $I_D = 15A$ )		$g_{fs}$	5.4	7.0	—	mhos

## dynamic characteristics

Input Capacitance	$V_{GS} = 0V$	$C_{iss}$	—	1400	1600	pF
Output Capacitance	$V_{DS} = 25V$	$C_{oss}$	—	550	800	pF
Reverse Transfer Capacitance	$f = 1 MHz$	$C_{rss}$	—	120	300	pF

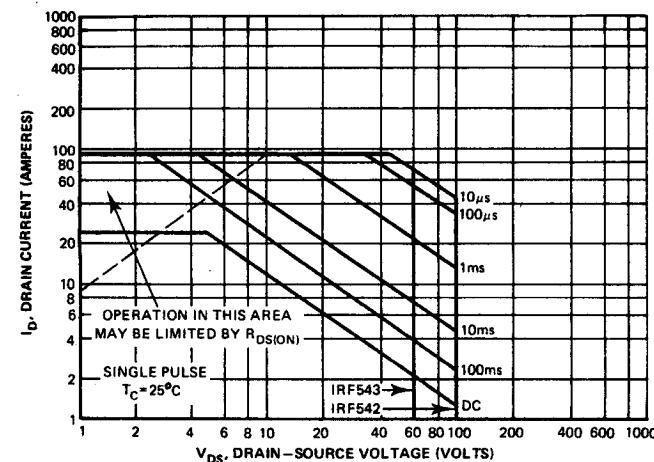
## switching characteristics\*

Turn-on Delay Time	$V_{DS} = 30V$	$t_{d(on)}$	—	20	—	ns
Rise Time	$I_D = 15A$ , $V_{GS} = 15V$	$t_r$	—	115	—	ns
Turn-off Delay Time	$R_{GEN} = 50\Omega$ , $R_{GS} = 12.5\Omega$	$t_{d(off)}$	—	50	—	ns
Fall Time	( $R_{GS}$ (EQUIV.) = $10\Omega$ )	$t_f$	—	30	—	ns

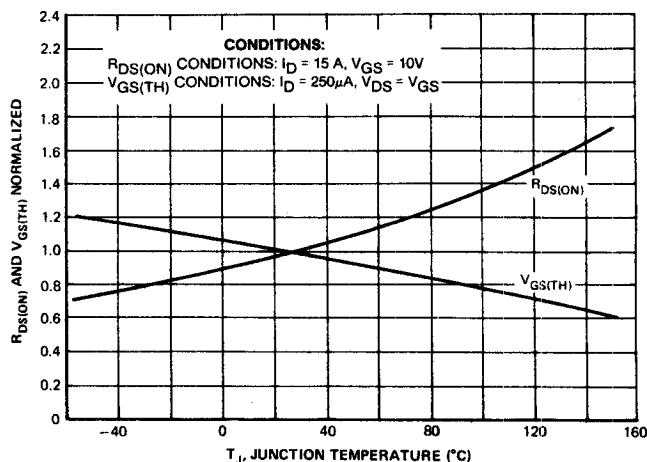
## source-drain diode ratings and characteristics\*

Continuous Source Current	$I_S$	—	—	24	A
Pulsed Source Current	$I_{SM}$	—	—	96	A
Diode Forward Voltage ( $T_C = 25^\circ C$ , $V_{GS} = 0V$ , $I_S = 24A$ )	$V_{SD}$	—	1.1	2.3	Volts
Reverse Recovery Time ( $I_S = 27A$ , $dI_S/dt = 100A/\mu sec$ , $T_C = 125^\circ C$ )	$t_{rr}$ $Q_{RR}$	—	250 2.0	—	ns $\mu C$

\*Pulse Test: Pulse width  $\leq 300 \mu s$ , duty cycle  $\leq 2\%$



MAXIMUM SAFE OPERATING AREA



TYPICAL NORMALIZED  $R_{DS(ON)}$  AND  $V_{GS(TH)}$  VS. TEMP.