

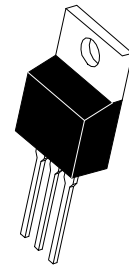
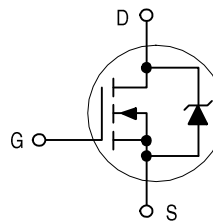


# IRF530

**TMOS POWER FET**  
**14 AMPERES**  
**100 VOLTS**  
 $R_{DS(on)} = 0.140 \Omega$

## Power Field Effect Transistor N-Channel Enhancement-Mode Silicon Gate

- Avalanche Energy Specified
- Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- $I_{DSS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature



TO-220AB

### MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DS}$	100	Vdc
Drain-to-Gate Voltage ( $R_{GS} = 1.0 \text{ M}\Omega$ )	$V_{DGR}$	100	Vdc
Gate-to-Source Voltage — oltage — Single Pulse ( $t_p \leq 50 \mu\text{s}$ )	$V_{GS}$ $V_{GSM}$	$\pm 20$ $\pm 25$	Vdc Vdc
Drain Current — Current — Continuous @ $100^\circ$ Current — Single Pulse ( $t_p \leq 10 \mu\text{s}$ )	$I_D$ $I_D$ $I_{DM}$	14 10 49	Adc Adc Apk
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	78 0.63	Watts W/ $^\circ\text{C}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$

### UNCLAMPED DRAIN-TO-SOURCE AVALANCHE CHARACTERISTICS ( $T_J < 150^\circ\text{C}$ )

Single Pulse Drain-to-Source Avalanche Energy — STARTING $T_J = 25^\circ\text{C}$ ( $V_{DD} = 75 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , PEAK $I_L = 14 \text{ A}$ , $L = 1.0 \text{ mH}$ , $R_G = 25 \Omega$ )	$E_{AS}$	98	mJ
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### THERMAL CHARACTERISTICS

Thermal Resistance — Junction-to- Resistance — Junction-to-	$R_{\theta JC}$ $R_{\theta JA}$	1.60 62.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	275	$^\circ\text{C}$

# IRF530

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 0.25 mA) Temperature Coefficient (Positive)	V <sub>(BR)DSS</sub>	100 —	— 112	— —	Vdc V/°C	
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 100 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 100 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	— —	— —	10 100	μAdc	
Gate-Body Leakage Current (V <sub>GS</sub> = ±20 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	—	—	100	nAdc	
<b>ON CHARACTERISTICS(1)</b>						
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mA) Threshold Temperature Coefficient (Negative)	V <sub>GS(th)</sub>	2.0 —	2.9 6.2	4.0 —	Vdc mV/°C	
Static Drain-to-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 8.0 Adc)	R <sub>DS(on)</sub>	—	0.098	0.140	Ohms	
Drain-to-Source On-Voltage (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 14 Adc) (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 8.0 Adc, T <sub>J</sub> = 125°C)	V <sub>DS(on)</sub>	— —	— —	— —	Vdc	
Forward Transconductance (V <sub>DS</sub> = 15 Vdc, I <sub>D</sub> = 8.0 Adc)	g <sub>FS</sub>	4.0	7.4	—	Mhos	
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0 Vdc, f = 1.0 MHz)	C <sub>iss</sub>	—	700	800	pF
Output Capacitance		C <sub>oss</sub>	—	200	500	
Transfer Capacitance		C <sub>rss</sub>	—	65	150	
<b>SWITCHING CHARACTERISTICS(2)</b>						
Turn-On Delay Time	(V <sub>DS</sub> = 36 Vdc, I <sub>D</sub> = 8.0 Adc, V <sub>GS</sub> = 10 Vdc, R <sub>G</sub> = 15 Ω)	t <sub>d(on)</sub>	—	9.0	30	ns
Rise Time		t <sub>r</sub>	—	47	75	
Turn-Off Delay Time		t <sub>d(off)</sub>	—	33	40	
Fall Time		t <sub>f</sub>	—	34	45	
Gate Charge	(V <sub>DS</sub> = 80 Vdc, I <sub>D</sub> = 14 Adc, V <sub>GS</sub> = 10 Vdc)	Q <sub>T</sub>	—	26	40	nC
		Q <sub>1</sub>	—	5.0	—	
		Q <sub>2</sub>	—	13	—	
		Q <sub>3</sub>	—	11	—	
<b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>						
Forward On-Voltage (I <sub>S</sub> = 14 Adc, V <sub>GS</sub> = 0 Vdc) (I <sub>S</sub> = 14 Adc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C)	V <sub>SD</sub>	— —	0.92 0.80	1.5 —	Vdc	
Reverse Recovery Time	(I <sub>S</sub> = 14 Adc, di <sub>S</sub> /dt = 100 A/μs)	t <sub>rr</sub>	—	103	—	nS
		t <sub>a</sub>	—	78	—	
		t <sub>b</sub>	—	25	—	
Reverse Recovery Stored Charge	Q <sub>RR</sub>	—	0.46	—	μC	
<b>INTERNAL PACKAGE INDUCTANCE</b>						
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)	L <sub>D</sub>	—	3.5	—	nH	
Internal Source Inductance (Measured from screw on tab to source bond pad)	L <sub>S</sub>	—	7.5	—		

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

(2) Switching characteristics are independent of operating junction temperature.

(3) Reflects typical values.  $C_{pk} = \left| \frac{\text{Max limit} - \text{Typ}}{3 \times \text{sigma}} \right|$

TYPICAL ELECTRICAL CHARACTERISTICS

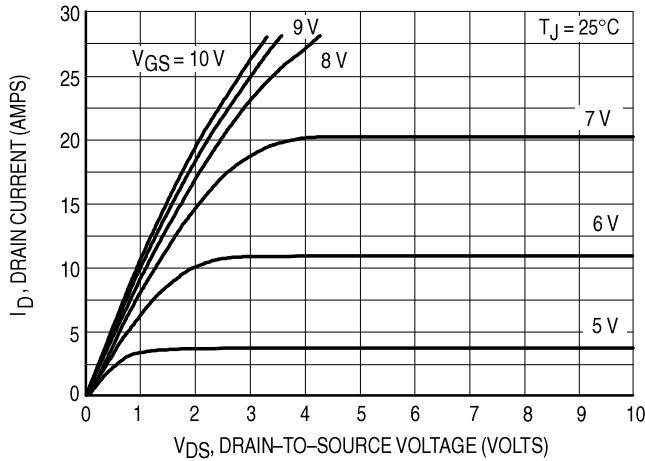


Figure 1. On-Region Characteristics

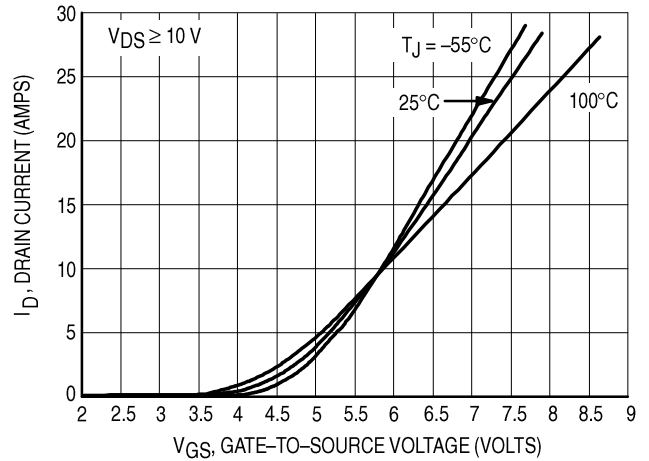


Figure 2. Transfer Characteristics

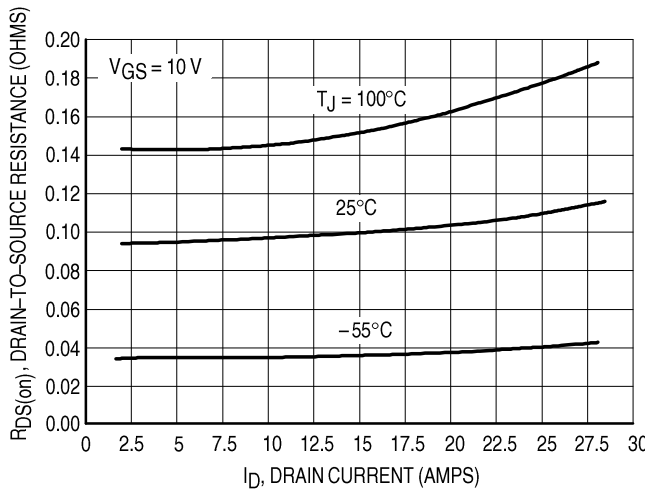


Figure 3. On-Resistance versus Drain Current and Temperature

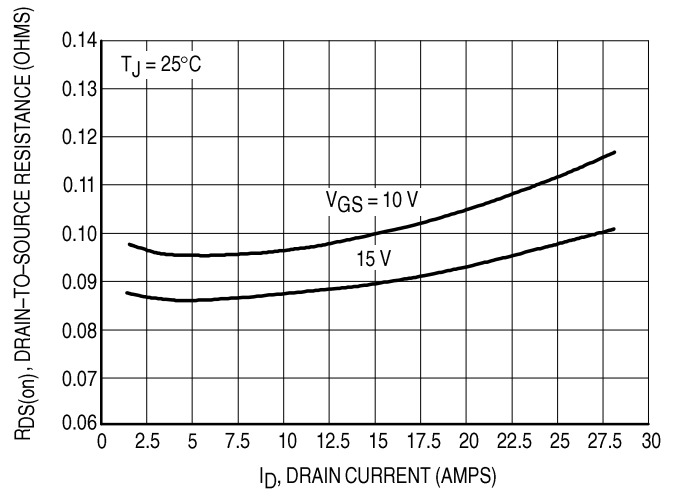


Figure 4. On-Resistance versus Drain Current and Gate Voltage

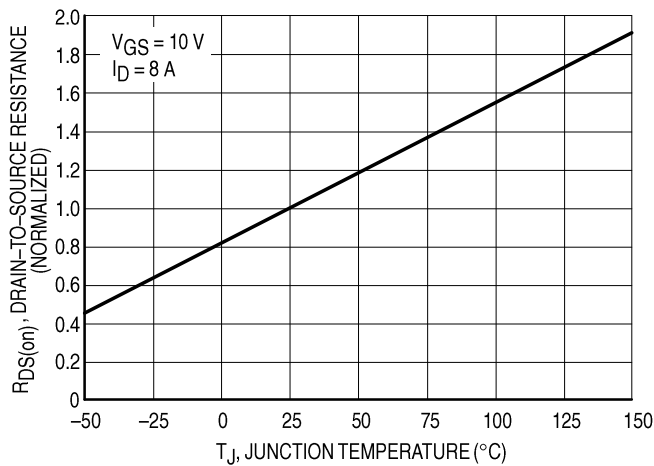


Figure 5. On-Resistance Variation with Temperature

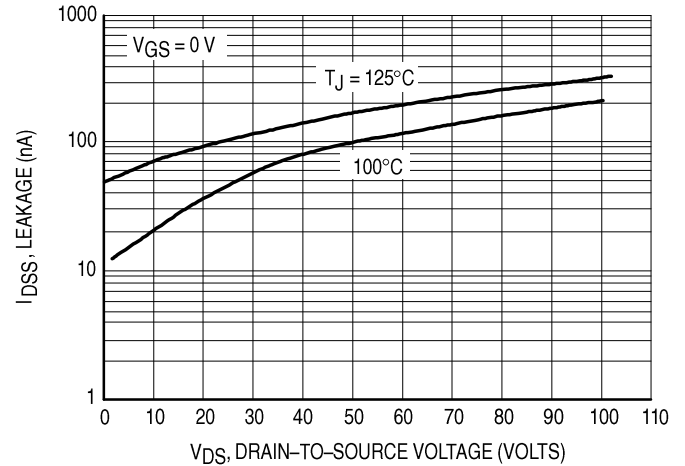


Figure 6. Drain-To-Source Leakage Current versus Voltage

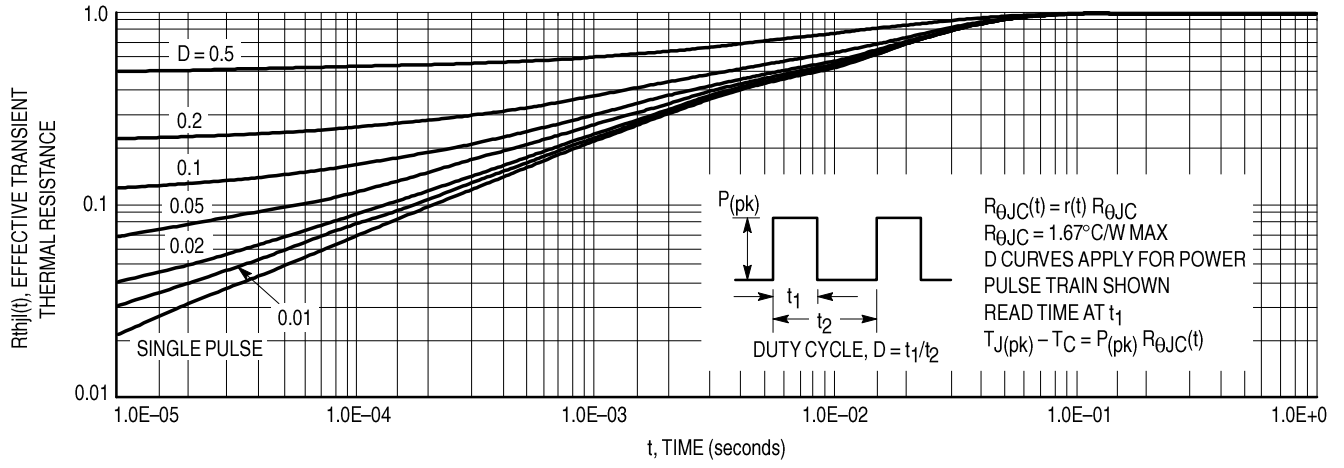
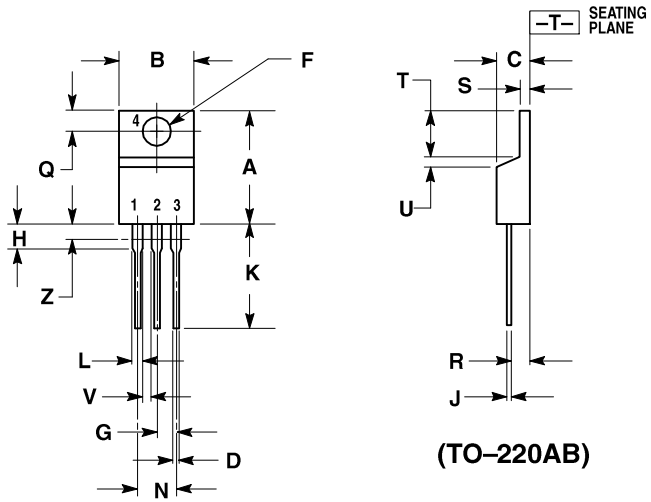


Figure 13. Thermal Response

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	—	1.15	—
Z	—	0.080	—	2.04