

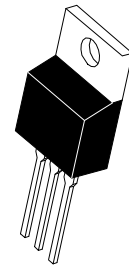
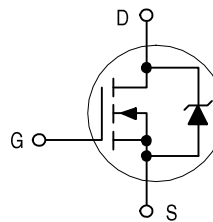


IRF530

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}	± 20 ± 25	Vdc Vdc
Drain Current — Current — Continuous @ 100° Current — Single Pulse ($t_p \leq 10 \mu\text{s}$)	I_D I_D I_{DM}	14 10 49	Adc Adc Apc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°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** ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 0.25\text{ mAdc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	100 —	— 112	— —	Vdc V/ $^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{DS} = 100\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 100\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{DSS}	— —	— —	10 100	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 20\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	—	—	100	nAdc

ON CHARACTERISTICS(1)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 0.25\text{ mA}$) Threshold Temperature Coefficient (Negative)	$C_{pk} \geq 2.0^{(3)}$	$V_{GS(th)}$	2.0 —	2.9 6.2	4.0 —	Vdc mV/ $^\circ\text{C}$
Static Drain-to-Source On-Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 8.0\text{ Adc}$)	$C_{pk} \geq 2.0^{(3)}$	$R_{DS(on)}$	—	0.098	0.140	Ohms
Drain-to-Source On-Voltage ($V_{GS} = 10\text{ Vdc}$, $I_D = 14\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 8.0\text{ Adc}$, $T_J = 125^\circ\text{C}$)		$V_{DS(on)}$	— —	— —	— —	Vdc
Forward Transconductance ($V_{DS} = 15\text{ Vdc}$, $I_D = 8.0\text{ Adc}$)		g_{FS}	4.0	7.4	—	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	—	700	800	pF
Output Capacitance		C_{oss}	—	200	500	
Transfer Capacitance		C_{rss}	—	65	150	

SWITCHING CHARACTERISTICS(2)

Turn-On Delay Time	$(V_{DS} = 36\text{ Vdc}$, $I_D = 8.0\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$, $R_G = 15\ \Omega$)	$t_{d(on)}$	—	9.0	30	ns
Rise Time		t_r	—	47	75	
Turn-Off Delay Time		$t_{d(off)}$	—	33	40	
Fall Time		t_f	—	34	45	
Gate Charge	$(V_{DS} = 80\text{ Vdc}$, $I_D = 14\text{ Adc}$, $V_{GS} = 10\text{ Vdc}$)	Q_T	—	26	40	nC
		Q_1	—	5.0	—	
		Q_2	—	13	—	
		Q_3	—	11	—	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage ($I_S = 14\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) ($I_S = 14\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	V_{SD}	— —	0.92 0.80	1.5 —	Vdc
Reverse Recovery Time	$(I_S = 14\text{ Adc}$, $dI_S/dt = 100\text{ A}/\mu\text{S}$)	t_{rr}	—	103	nS
		t_a	—	78	
		t_b	—	25	
Reverse Recovery Stored Charge		Q_{RR}	—	0.46	μC

INTERNAL PACKAGE INDUCTANCE

Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)	L_D	—	3.5	—	nH
Internal Source Inductance (Measured from screw on tab to source bond pad)	L_S	—	7.5	—	

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{S}$, Duty Cycle $\leq 2\%$.

(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

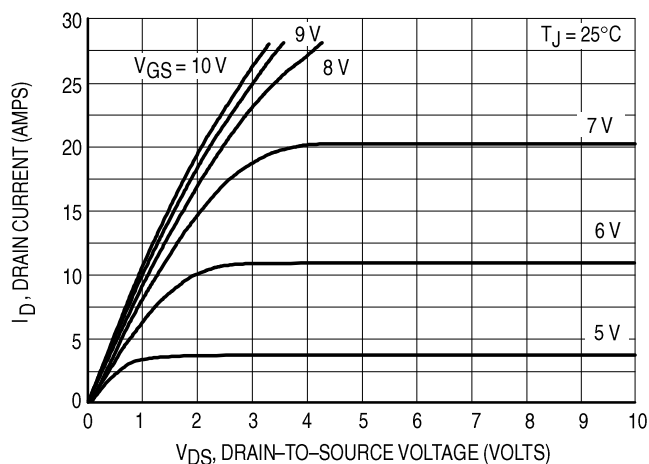


Figure 1. On-Region Characteristics

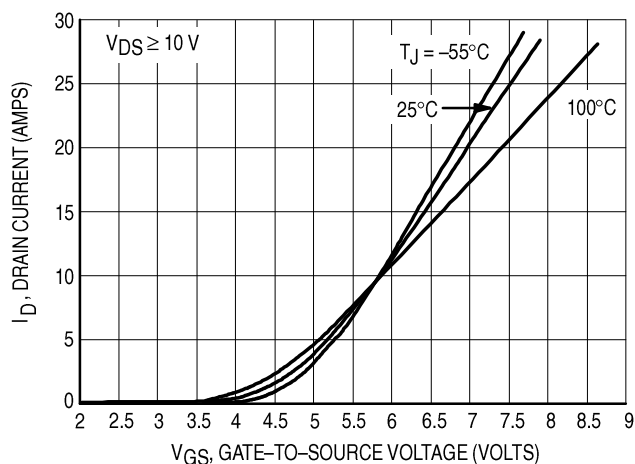


Figure 2. Transfer Characteristics

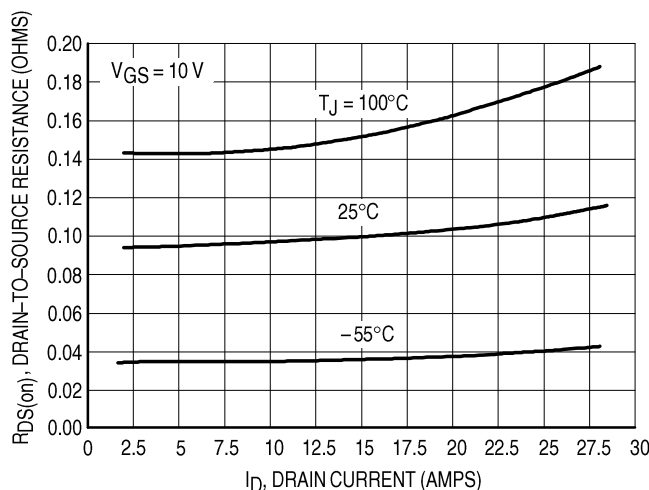


Figure 3. On-Resistance versus Drain Current and Temperature

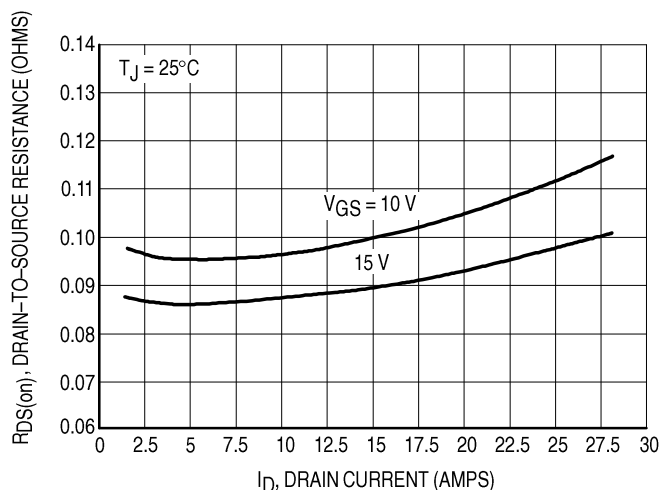


Figure 4. On-Resistance versus Drain Current and Gate Voltage

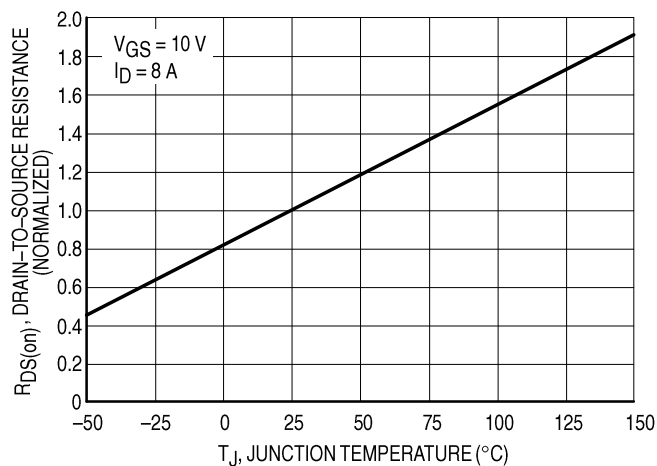


Figure 5. On-Resistance Variation with Temperature

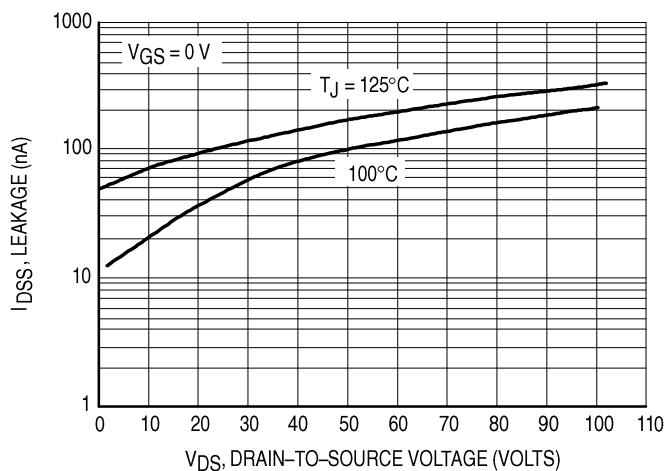


Figure 6. Drain-To-Source Leakage Current versus Voltage

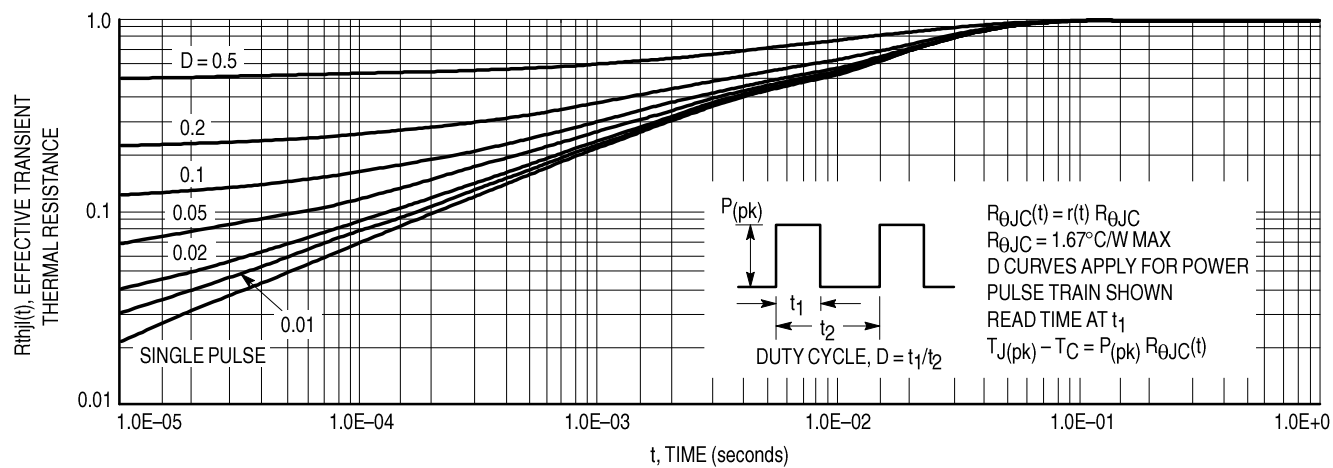
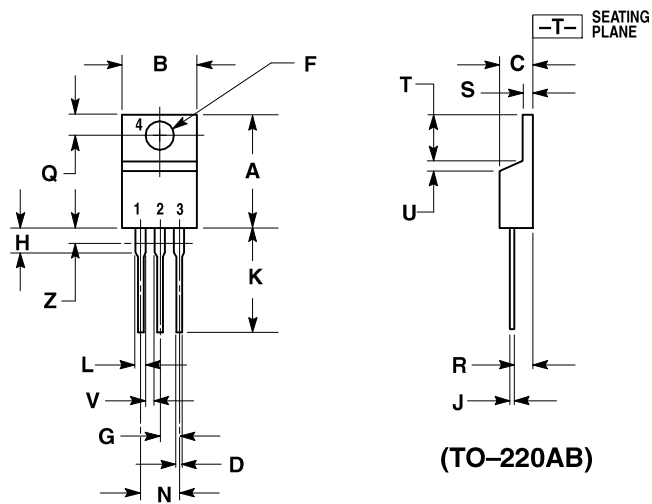


Figure 13. Thermal Response

PACKAGE DIMENSIONS



(TO-220AB)

- 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