POWER·MOS FET
FIELD EFFECT POWER TRANSISTOR

IRF430,431
D86DR2,R1

4.5 AMPERES
500, 450 VOLTS
$R_{DS}(ON) = 1.5 \ \Omega$

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

N-CHANNEL

CASE STYLE TO-204AA (TO-3)
DIMENSIONS ARE IN INCHES AND (MILLIMETERS)
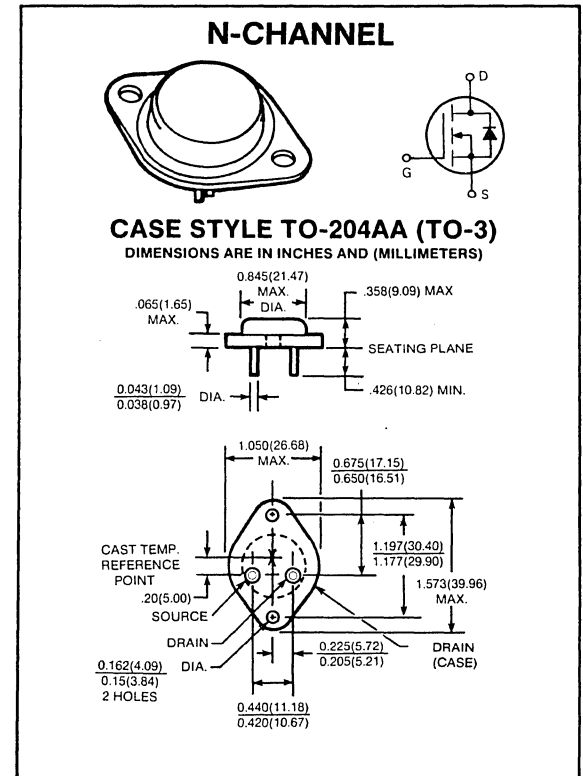
maximum ratings ($T_C = 25°C$) (unless otherwise specified)

RATING	SYMBOL	IRF430/D86DR2	IRF431/D86DR1	UNITS
Drain-Source Voltage	V_{DSS}	500	450	Volts
Drain-Gate Voltage, $R_{GS} = 1M\Omega$	V_{DGR}	500	450	Volts
Continuous Drain Current @ $T_C = 25°C$ @ $T_C = 100°C$	I_D	4.5 3.0	4.5 3.0	A A
Pulsed Drain Current[1]	I_{DM}	18	18	A
Gate-Source Voltage	V_{GS}	±20	±20	Volts
Total Power Dissipation @ $T_C = 25°C$ Derate Above 25°C	P_D	75 0.6	75 0.6	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{STG}	–55 to 150	–55 to 150	°C

thermal characteristics

Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.67	1.67	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	30	30	°C/W
Maximum Lead Temperature for Soldering Purposes: ⅛" from Case for 5 Seconds	T_L	260	260	°C

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

electrical characteristics ($T_C = 25°C$) (unless otherwise specified)

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT

off characteristics

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage ($V_{GS} = 0V$, $I_D = 250\,\mu A$)	IRF430/D86DR2 IRF431/D86DR1	BV_{DSS}	500 450	— —	— —	Volts
Zero Gate Voltage Drain Current (V_{DS} = Max Rating, $V_{GS} = 0V$, $T_C = 25°C$) (V_{DS} = Max Rating, × 0.8, $V_{GS} = 0V$, $T_C = 125°C$)		I_{DSS}	— —	— —	250 1000	μA
Gate-Source Leakage Current ($V_{GS} = \pm 20V$)		I_{GSS}	—	—	± 100	nA

on characteristics*

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\,\mu A$)	$T_C = 25°C$	$V_{GS(TH)}$	2.0	—	4.0	Volts
On-State Drain Current ($V_{GS} = 10V$, $V_{DS} = 10V$)		$I_{D(ON)}$	4.5	—	—	A
Static Drain-Source On-State Resistance ($V_{GS} = 10V$, $I_D = 2.5A$)		$R_{DS(ON)}$	—	1.3	1.5	Ohms
Forward Transconductance ($V_{DS} = 10V$, $I_D = 2.5A$)		g_{fs}	1.75	2.2	—	mhos

dynamic characteristics

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
Input Capacitance	$V_{GS} = 0V$	C_{iss}	—	650	800	pF
Output Capacitance	$V_{DS} = 25V$	C_{oss}	—	90	200	pF
Reverse Transfer Capacitance	f = 1 MHz	C_{rss}	—	15	60	pF

switching characteristics*

CHARACTERISTIC		SYMBOL	MIN	TYP	MAX	UNIT
Turn-on Delay Time	$V_{DS} = 225V$	$t_{d(on)}$	—	15	—	ns
Rise Time	$I_D = 2.5A$, $V_{GS} = 15V$	t_r	—	10	—	ns
Turn-off Delay Time	$R_{GEN} = 50\Omega$, $R_{GS} = 12.5\Omega$	$t_{d(off)}$	—	40	—	ns
Fall Time	($R_{GS\ (EQUIV.)} = 10\Omega$)	t_f	—	25	—	ns

source-drain diode ratings and characteristics*

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Continuous Source Current	I_S	—	—	4.5	A
Pulsed Source Current	I_{SM}	—	—	18	A
Diode Forward Voltage ($T_C = 25°C$, $V_{GS} = 0V$, $I_S = 4.5A$)	V_{SD}	—	1.0	1.4	Volts
Reverse Recovery Time ($I_S = 4.5A$, $dI_S/dt = 100A/\mu sec$, $T_C = 125°C$)	t_{rr} Q_{RR}	— —	460 4.5	— —	ns μC

*Pulse Test: Pulse width ≤ 300 μs, duty cycle ≤ 2%
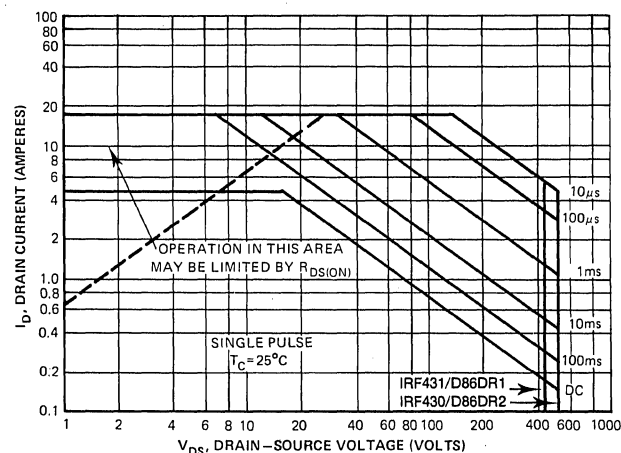
MAXIMUM SAFE OPERATING AREA
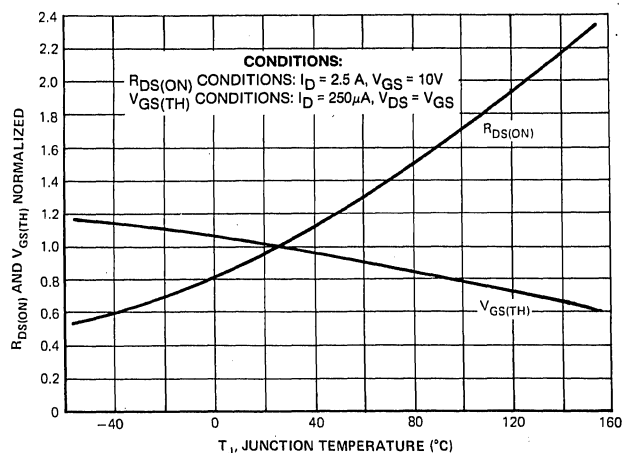
TYPICAL NORMALIZED $R_{DS(ON)}$ AND $V_{GS(TH)}$ VS. TEMP.