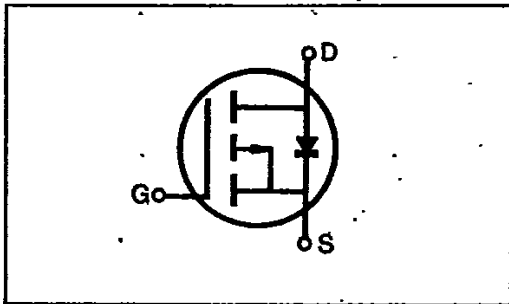


Preliminary Specifications

- 100 Volt, 0.2 Ohm SFET



PRODUCT SUMMARY

Part Number	V _{DS}	R _{DS(on)}	I _D
IRF/IRFP9140, IRF9540	-100V	0.2Ω	-19A
IRF/IRFP9141, IRF9541	-60V	0.2Ω	-19A
IRF/IRFP9142, IRF9542	-100V	0.3Ω	-15A
IRF/IRFP9143, IRF9543	-60V	0.3Ω	-15A

FEATURES

- Low R_{DS(on)}
- Improved inductive ruggedness
- Fast switching times
- Rugged polysilicon gate cell structure
- Low input capacitance
- Extended safe operating area
- Improved high temperature reliability

PACKAGE STYLE

Package Type	Part Number
TO-3	IRF9140/9141/9142/9143
TO-3P	IRFP9140/9141/9142/9143
TO-220	IRF9540/9541/9542/9543

MAXIMUM RATINGS

Characteristic	Symbol	IRF/IRFP				Unit
		9140 9540	9141 9541	9142 9542	9143 9543	
Drain-Source Voltage (1)	V _{DSS}	-100	-60	-100	-60	V _{dc}
Drain-Gate Voltage (R _{GS} =1.0MΩ) (1)	V _{DGR}	-100	-60	-100	-60	V _{dc}
Gate-Source Voltage	V _{GS}	±20				V _{dc}
Continuous Drain Current T _C =25°C	I _D	-19	-19	-15	-15	A _{dc}
Continuous Drain Current T _C =100°C	I _D	-12	-12	-10	-10	A _{dc}
Drain Current—Pulsed (3)	I _{DM}	-76	-76	-60	-60	A _{dc}
Gate Current—Pulsed	I _{GM}	±1.5				A _{dc}
Total Power Dissipation @ T _C =25°C Derate above 25°C	P _D	125 1.0				Watts W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to 150				°C
Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	T _L	300				°C

- Notes: (1) T_J=25°C to 150°C
 (2) Pulse test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
 (3) Repetitive rating: Pulse width limited by max. junction temperature

IRF9140/9141/9142/9143
 IRFP9140/9141/9142/9143
 IRF9540/9541/9542/9543

P-CHANNEL
 POWER MOSFETS

T-39-23

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

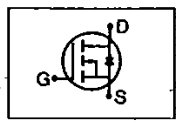
Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Drain-Source Breakdown Voltage	BV_{DSS}	IRF9140/2 IRFP9140/2 IRF9540/2	-100	—	—	V	$V_{GS}=0V$
		IRF9141/3 IRFP9141/2 IRF9541/3	-60	—	—	V	$I_D=-250\mu A$
Gate Threshold Voltage	$V_{GS(th)}$	ALL	-2.0	—	-4.0	V	$V_{DS}=V_{GS}$, $I_D=-250\mu A$
Gate-Source Leakage Forward	I_{GSS}	ALL	—	—	-100	nA	$V_{GS}=-20V$
Gate-Source Leakage Reverse	I_{GSS}	ALL	—	—	100	nA	$V_{GS}=20V$
Zero Gate Voltage Drain Current	I_{DSS}	ALL	—	—	-250	μA	$V_{DS}=\text{Max. Rating}$, $V_{GS}=0V$
			—	—	-1000	μA	$V_{DS}=\text{Max. Rating} \times 0.8$, $V_{GS}=0V$, $T_C=125^\circ\text{C}$
On-State Drain-Source Current(2)	$I_{D(on)}$	IRF9140/1 IRFP9140/1 IRF9540/1	-19	—	—	A	$V_{DS}>I_{D(on)} \times R_{DS(on) \text{ max.}}$, $V_{GS}=-10V$
		IRF9142/3 IRFP9142/3 IRF9542/3	-15	—	—	A	
Static Drain-Source On-State Resistance (2)	$R_{DS(on)}$	IRF9140/1 IRFP9140/1 IRF9540/1	—	—	0.2	Ω	$V_{GS}=-10V$, $I_D=-10A$
		IRF9142/3 IRFP9142/3 IRF9542/3	—	—	0.3	Ω	
Forward Transconductance (2)	g_{fs}	ALL	5.0	—	—		$V_{DS}>I_{D(on)} \times R_{DS(on) \text{ max.}}$, $I_D=-10A$
Input Capacitance	C_{iss}	ALL	—	—	1300	pF	$V_{GS}=0V$, $V_{DS}=-25V$, $f=1.0\text{MHz}$
Output Capacitance	C_{oss}	ALL	—	—	700	pF	
Reverse Transfer Capacitance	C_{rss}	ALL	—	—	400	pF	
Turn-On Delay Time	$t_{d(on)}$	ALL	—	—	30	ns	$V_{DD}=0.5BV_{DSS}$, $I_D=-10A$, $Z_0=4.7\Omega$, (MOSFET switching times are essentially independent of operating temperature.)
Rise Time	t_r	ALL	—	—	15	ns	
Turn-Off Delay Time	$t_{d(off)}$	ALL	—	—	20	ns	
Fall Time	t_f	ALL	—	—	12	ns	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q_g	ALL	—	—	90	nC	$V_{GS}=-15V$, $I_D=-24A$, $V_{DS}=0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature.)
Gate-Source Charge	Q_{gs}	ALL	—	—	30	nC	
Gate-Drain ("Miller") Charge	Q_{gd}	ALL	—	—	60	nC	

THERMAL RESISTANCE

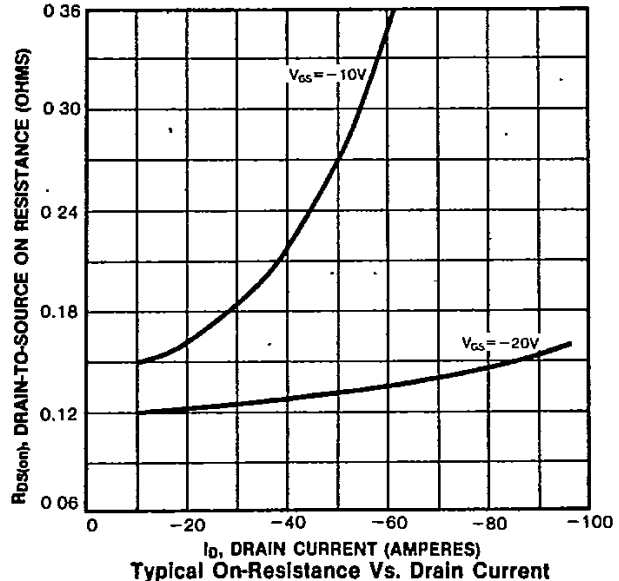
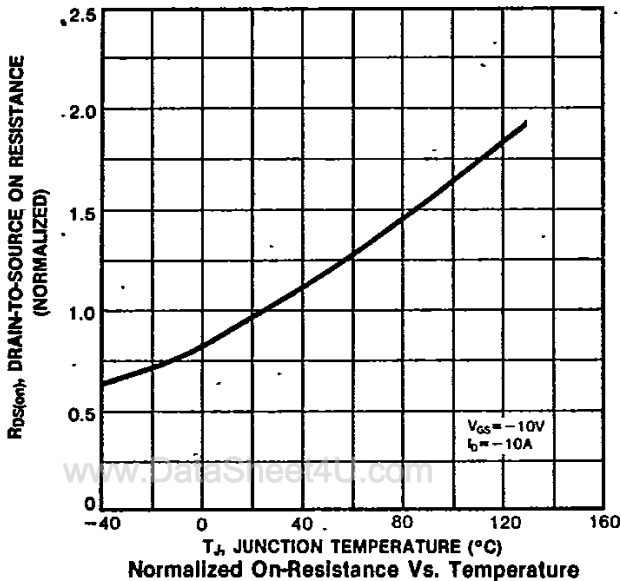
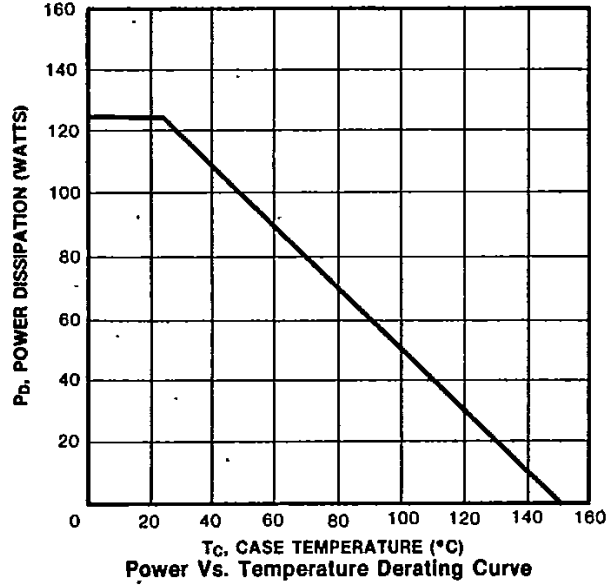
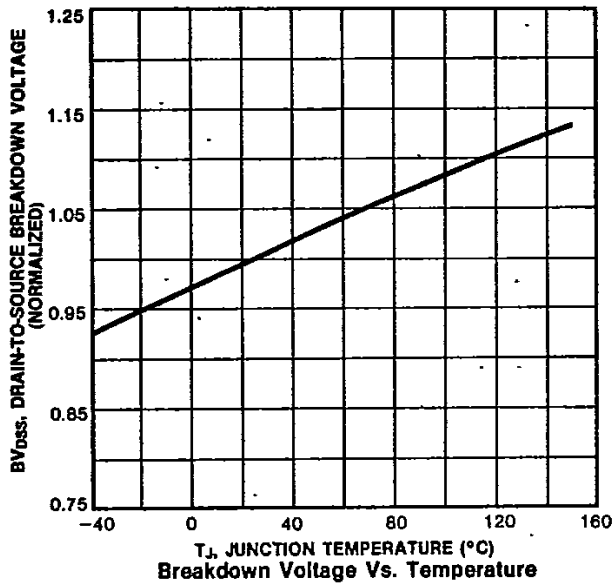
Junction-to-Case	R_{thJC}	ALL	—	—	1.0	K/W	Mounting surface flat, smooth, and greased
Case-to-Sink	R_{thCS}	ALL	—	0.1	—	K/W	
Junction-to-Ambient	R_{thJA}	IRFPXXXX IRF95XX	—	—	80	K/W	Free Air Operation
		IRF91XX	—	—	30	K/W	

- Notes: (1) $T_J=25^\circ\text{C}$ to 150°C
 (2) Pulse test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
 (3) Repetitive rating: Pulse width limited by max. junction temperature

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristic	Symbol	Type	Min	Typ	Max	Units	Test Conditions
Continuous Source Current (Body Diode)	I _S	IRF9140/1 IRFP9140/1 IRF9540/1	—	—	-19	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier 
		IRF9142/3 IRFP9142/3 IRF9542/3	—	—	-15	A	
Pulse Source Current (Body Diode) (3)	I _{SM}	IRF9140/1 IRFP9140/1 IRF9540/1	—	—	-76	A	
		IRF9142/3 IRFP9142/3 IRF9542/3	—	—	-60	A	
Diode Forward Voltage (2)	V _{SD}	IRF9140/1 IRFP9140/1 IRF9540/1	—	—	-4.2	V	T _C =25°C, I _S =-19A, V _{GS} =0V
		IRF9142/3 IRFP9142/3 IRF9542/3	—	—	-4.0	V	T _C =25°C, I _S =-15A, V _{GS} =0V
Reverse Recovery Time	t _{rr}	ALL	—	—	—	ns	T _J =150°C, I _F =-19A, dI _F /dt=100A/μs

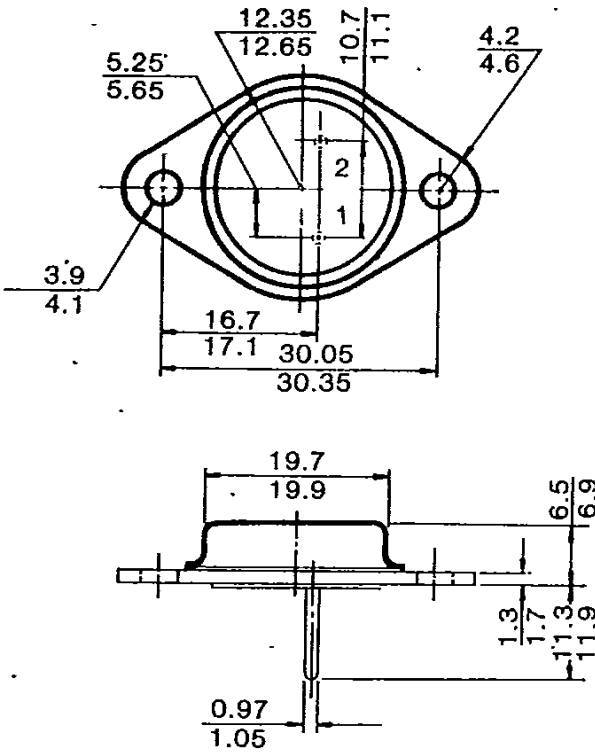
Notes: (1) T_J=25°C to 150°C (2) Pulse test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
 (3) Repetitive rating: Pulse width limited by max. junction temperature



PACKAGE DIMENSIONS

TO-3(Standard Type)

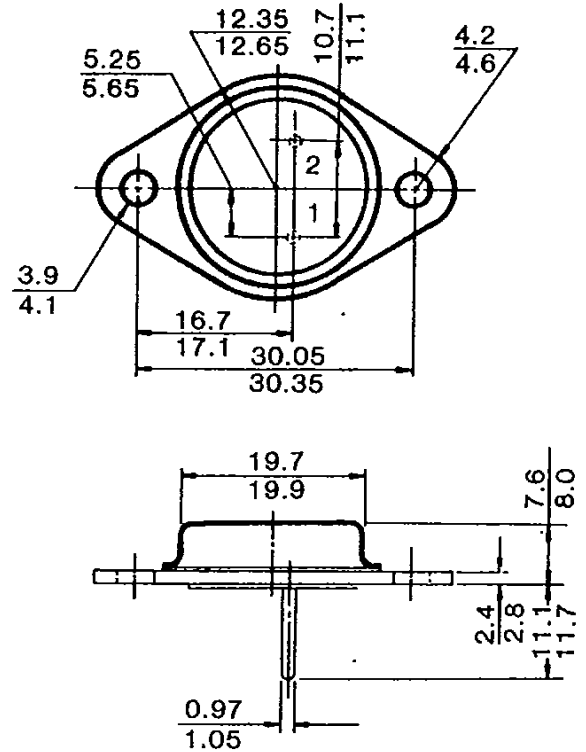
Unit: mm



1. Gate 2. Source Case: Drain

TO-3(High-Voltage Type)

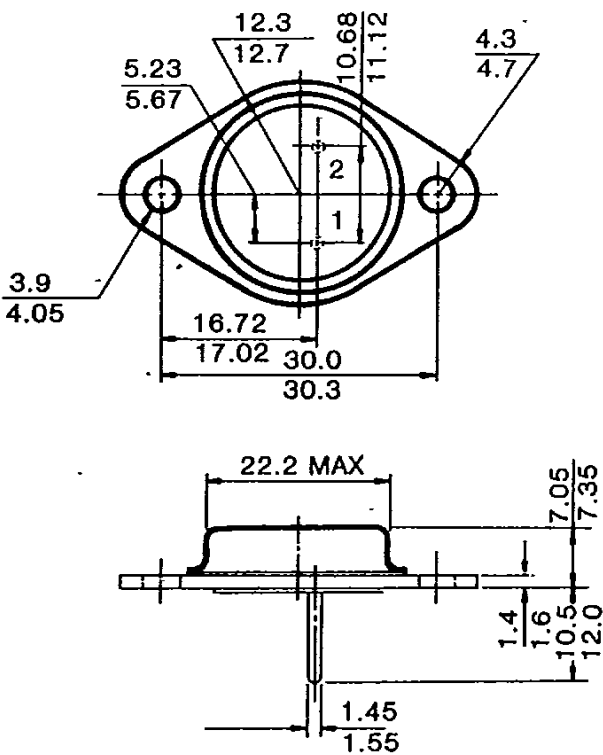
Unit: mm



1. Gate 2. Source Case: Drain

TO-3(High Current Type)

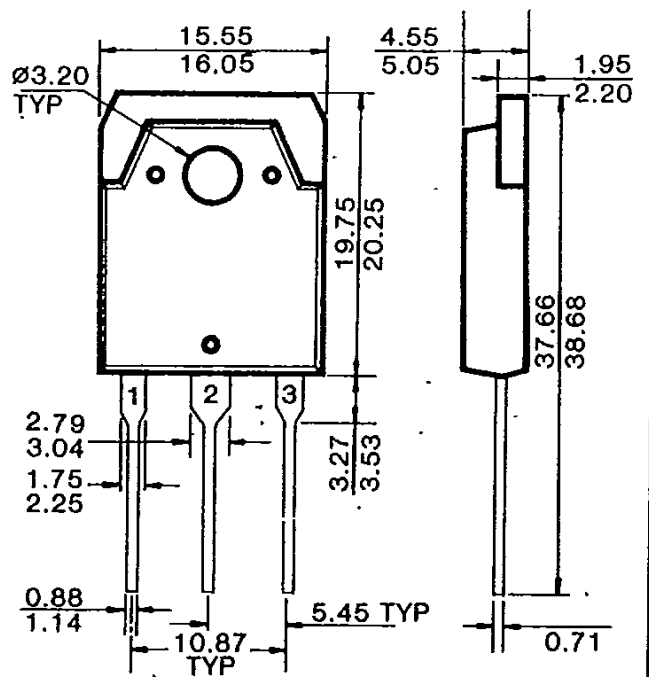
Unit: mm



1. Gate 2. Source Case: Drain

TO-3P

Unit: mm

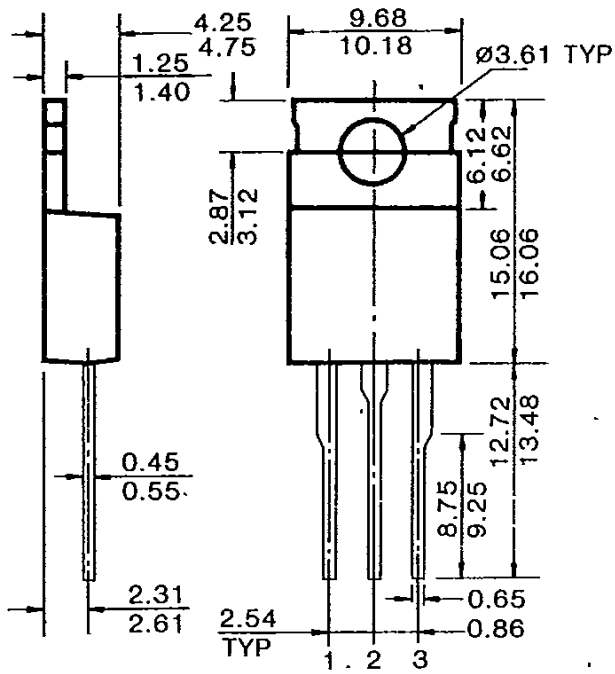


1. Gate 2. Drain 3. Source

PACKAGE DIMENSIONS

TO-220

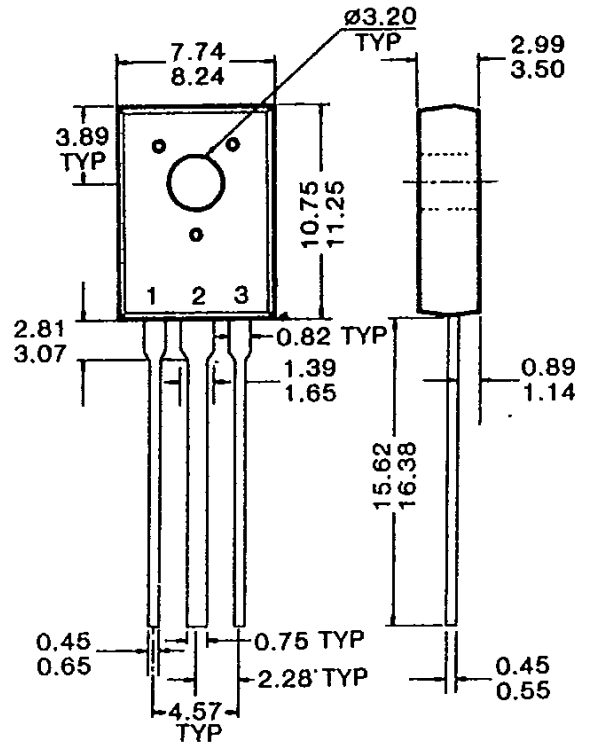
Unit: mm



1. Gate 2. Drain 3. Source

TO-126

Unit: mm



1. Gate 2. Drain 3. Source