



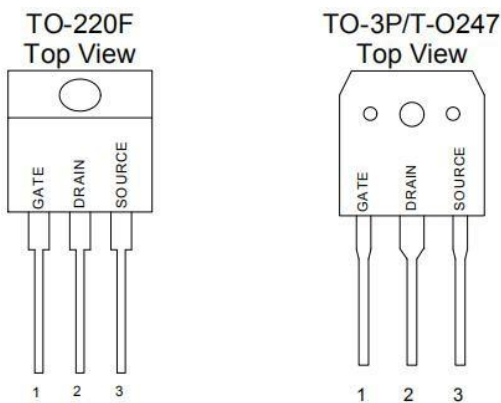
# GWM19S80

## POWER FIELD EFFECT TRANSISTOR

### GENERAL DESCRIPTION

This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

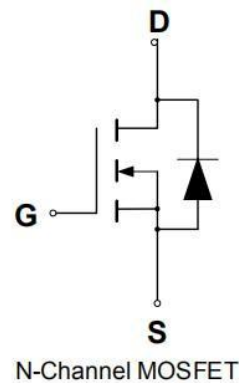
### PIN CONFIGURATION



### FEATURES

- ◆ Robust High Voltage Termination
- ◆ 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
- ◆ Isolated Mounting Hole Reduces Mounting Hardware

### SYMBOL



### ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	$I_{D(1)}$	19.4	A
— Pulsed	$I_{DM}$	58.3	
Gate-to-Source Voltage — Continue	$V_{GS}$	$\pm 20$	V
Total Power Dissipation — TO220FP	$P_D$	42	W
— TO3P		245	
— TO247		403	
Derate above 25°C — TO220FP		0.33	W/°C
— TO3P		1.96	
— TO247		3.23	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy — $T_J = 25^\circ\text{C}$ ( $V_{DD} = 100\text{V}$ , $V_{GS} = 10\text{V}$ , $I_L = 12\text{A}$ , $L = 10\text{mH}$ , $R_G = 25\Omega$ )	$E_{AS}$	720	mJ
Thermal Resistance — Junction to Case -TO220FP	$\theta_{JC}$	3	°C/W
— Junction to Case -TO3P		0.51	
— Junction to Case -TO247		0.31	
— Junction to Ambient -TO220FP	$\theta_{JA}$	62.5	
— Junction to Ambient -TO3P, TO247		40	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	260	°C

(1) Drain current limited by maximum junction temperature



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### ORDERING INFORMATION

Part Number	TOP MARK	Part Number	Packing Mthod	Note
GWM19S80N220FP(Note1)	GWM19S80X	TO-220FP	Tube	
GWM19S80N3P(Note1)	GWM19S80X	TO-3P	Tube	
GWM19S80N247(Note1)	GWM19S80X	TO-247	Tube	

**Note1:** X : Suffix for Halogen Free Product.

### ELECTRICAL CHARACTERISTICS

Unless otherwise specified,  $T_J = 25^{\circ}\text{C}$ .

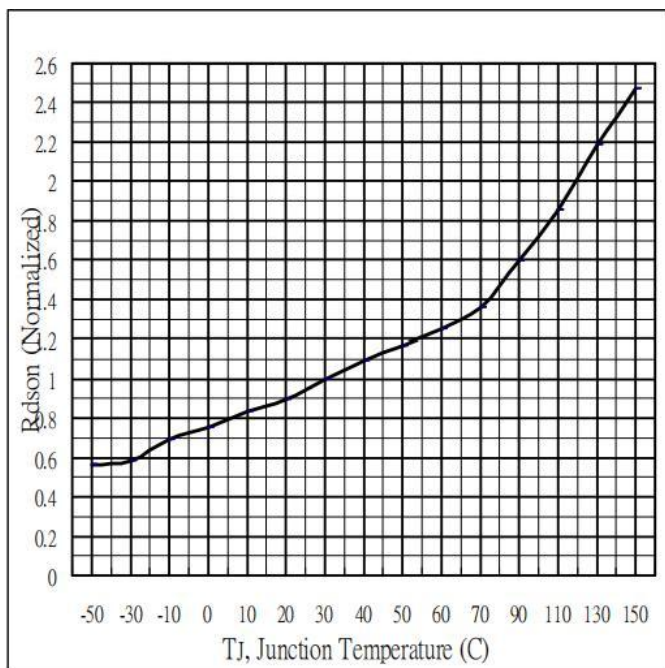
		GWM19S80			
Characteristic	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA)	V <sub>(BR)DSS</sub>	800			V
Drain-Source Leakage Current (V <sub>DS</sub> =800 V, V <sub>GS</sub> = 0 V)	I <sub>DSS</sub>			1	uA
Gate-Source Leakage Current-Forward (V <sub>gsf</sub> = 20 V, V <sub>DS</sub> = 0 V)	I <sub>GSSF</sub>			100	nA
Gate-Source Leakage Current-Reverse (V <sub>gsr</sub> = - 20 V, V <sub>DS</sub> = 0 V)	I <sub>GSSR</sub>			100	nA
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA)	V <sub>GS(th)</sub>	2	3	4	V
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6.3A) *		R <sub>DS(on)</sub>	220	260	mΩ
Input Capacitance	(V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>iss</sub>	3384.0		pF
Output Capacitance		C <sub>oss</sub>	203.0		pF
Reverse Transfer Capacitance		C <sub>rss</sub>	50.0		pF
Turn-On Delay Time	(V <sub>DD</sub> = 300 V, I <sub>D</sub> = 19 A, R <sub>G</sub> = 25Ω) *	t <sub>d(on)</sub>	40.6		ns
Rise Time		t <sub>r</sub>	69.8		ns
Turn-Off Delay Time		t <sub>d(off)</sub>	101.6		ns
Fall Time		t <sub>f</sub>	68.4		ns
Total Gate Charge	(V <sub>DS</sub> = 480 V, I <sub>D</sub> = 19 A, V <sub>GS</sub> = 10 V)*	Q <sub>g</sub>	74.42		nC
Gate-Source Charge		Q <sub>gs</sub>	19.4		nC
Gate-Drain Charge		Q <sub>gd</sub>	28		nC
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage(1)	(I <sub>S</sub> = 19 A, dI <sub>S</sub> /d <sub>t</sub> = 100A/μs)	V <sub>SD</sub>		1.5	V
Forward Turn-On Time		t <sub>on</sub>	**		ns
Reverse Recovery Time		t <sub>rr</sub>	522.8		ns

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

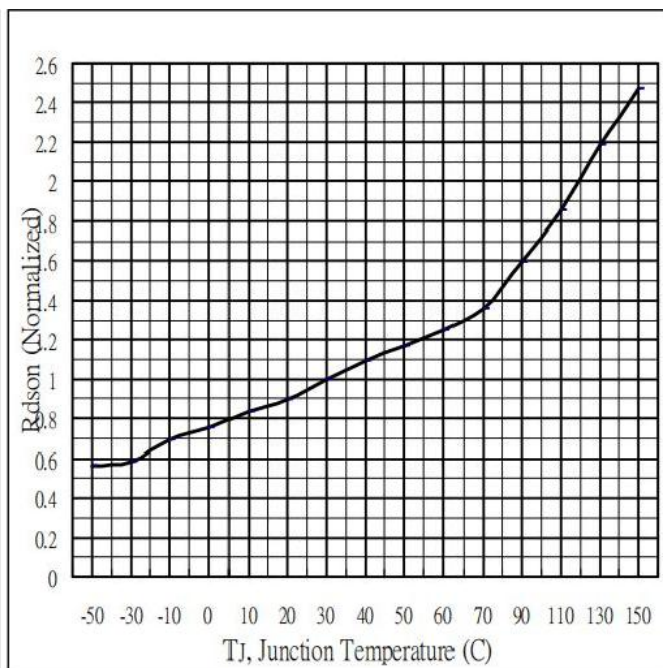
\*\* Negligible, Dominated by circuit inductance



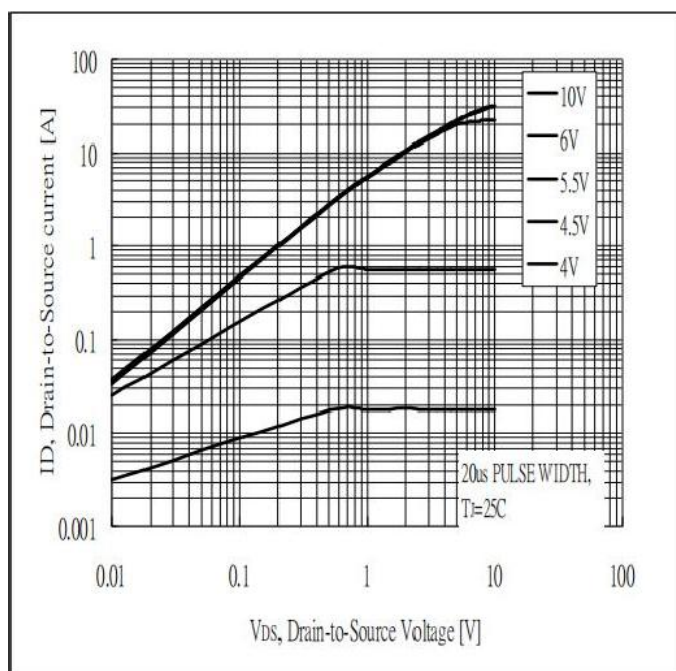
## TYPICAL ELECTRICAL CHARACTERISTICS



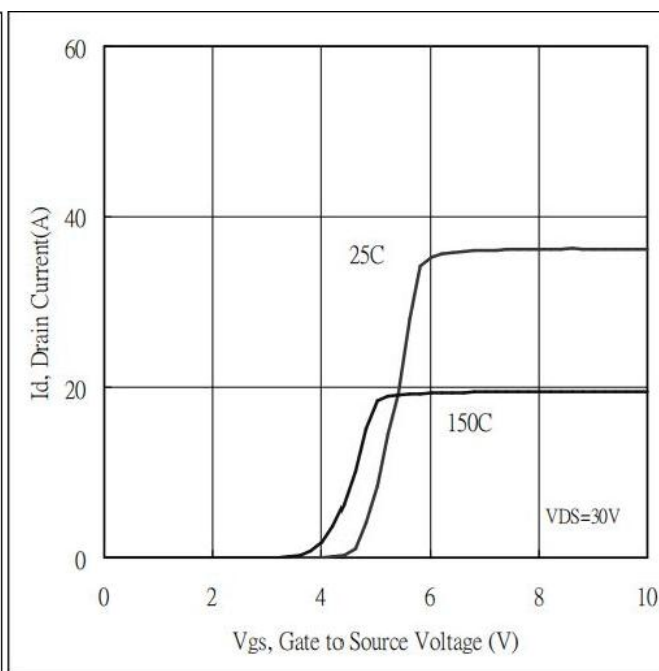
**Fig 1. On-Resistance Variation with vs. Temperature**



**Fig.2 Breakdown Voltage Variation vs. Temperature**



**Fig 3. Typical Output Characteristics**



**Fig 4. Typical Transfer Characteristics**