



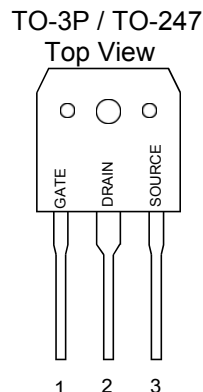
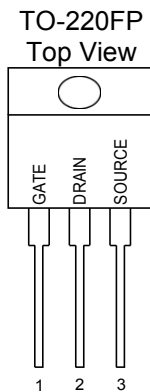
GWM45S60

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.

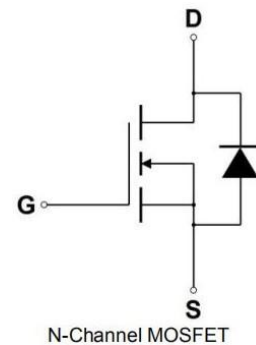
PIN CONFIGURATION



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	$I_{D\ 25C(1)}$	44.5	A
— Pulsed	$I_{D\ 100C(1)}$	28.2	
	I_{DM}	135	
Gate-to-Source Voltage — Continue	V_{GS}	± 30	V
Total Power Dissipation TO-220FP	P_D	50	W
TO-3P		446	
TO-247		431	
Derate above 25°C TO-220FP		0.40	W/°C
TO-3P		3.57	
TO-247		3.45	
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}	809	mJ
Thermal Resistance — Junction to Case TO-220FP	θ_{JC}	2.5	°C/W
— Junction to Case TO-3P		0.28	
— Junction to Case TO-247		0.29	
— Junction to Ambient TO-220FP	θ_{JA}	62.5	
— Junction to Ambient TO-3P, TO-247		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, TO-3P Package.



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ORDERING INFORMATION

Part Number	TOP MARK	Part Number	Packing Mthod	Note
GWM45S60XN220FP(Note1)	GWM45S60	TO-220FP	Tube	
GWM45S60XN3P(Note1)	GWM45S60	TO-3P	Tube	
GWM45S60XN247(Note1)	GWM45S60	TO-247	Tube	

Note1: X : Suffix for Halogen Free Product

ELECTRICAL CHARACTERISTICS

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

		GWM45S60				
Characteristic		Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage (V _{GS} = 0 V, I _D = 250 μA)		V _{(BR)DSS}	600			V
Drain-Source Leakage Current (V _{DS} =600 V, V _{GS} = 0 V)		I _{DSS}			10	uA
Gate-Source Leakage Current-Forward (V _{gsf} = 30 V, V _{DS} = 0 V)		I _{GSSF}			100	nA
Gate-Source Leakage Current-Reverse (V _{gsr} = - 30 V, V _{DS} = 0 V)		I _{GSSR}			100	nA
Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 μA)		V _{GS(th)}	2	3	4	V
Static Drain-Source On-Resistance (V _{GS} = 10 V, I _D = 15.6A) *		R _{DS(on)}		75	90	mΩ
Gate resistance (f=1MHz, open drain)		R _G		3.6		Ω
Input Capacitance	(V _{DS} = 100 V, V _{GS} = 0 V, f = 1.0 MHz)	C _{iss}		2808		pF
Output Capacitance		C _{oss}		125		pF
Reverse Transfer Capacitance		C _{rss}		37		pF
Turn-On Delay Time	(V _{DD} = 300 V, I _D = 45 A, R _G = 4.7Ω) *	t _{d(on)}		37		ns
Rise Time		t _r		106		ns
Turn-Off Delay Time		t _{d(off)}		95		ns
Fall Time		t _f		93		ns
Total Gate Charge	VDD=480V, ID=45A, VGS=10V	Q _g		69		nC
Gate-Source Charge		Q _{gs}		18		nC
Gate-Drain Charge		Q _{gd}		30		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I _S = 45 A, d _{IS} /d _t = 100A/μs)	V _{SD}			1.5	V
Forward Turn-On Time		t _{on}		**		ns
Reverse Recovery Time		t _{rr}		170		ns

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

** Negligible, Dominated by circuit inductance



TYPICAL ELECTRICAL CHARACTERISTICS

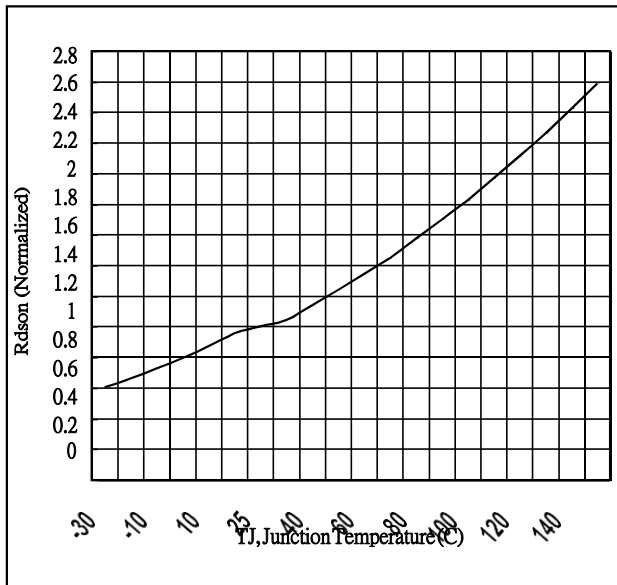


Fig 1. On-Resistance Variation with vs. Temperature

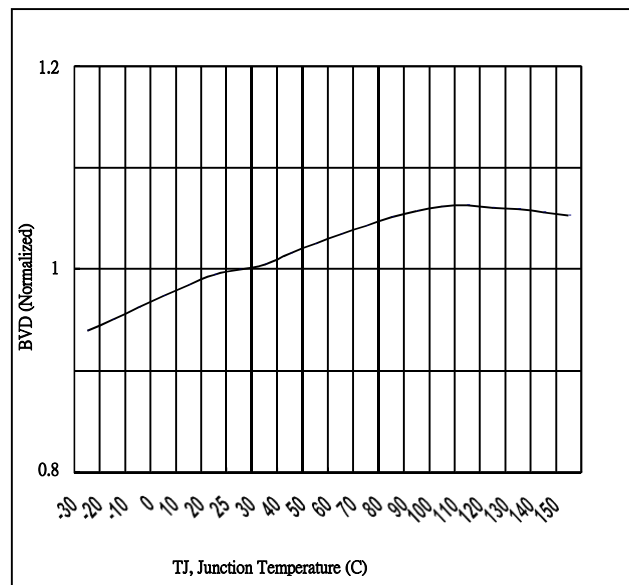


Fig.2 Breakdown Voltage Variation vs. Temperature

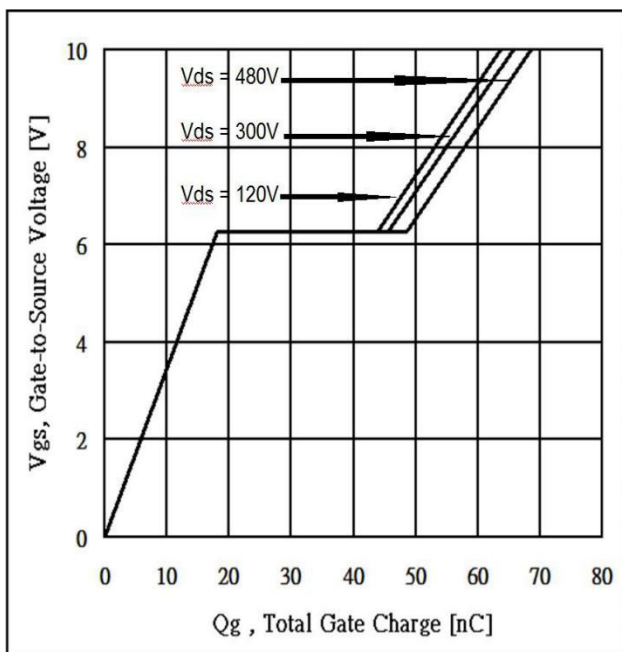


Fig 3. Typical Gate Charge vs. Gate-to-Source Voltage

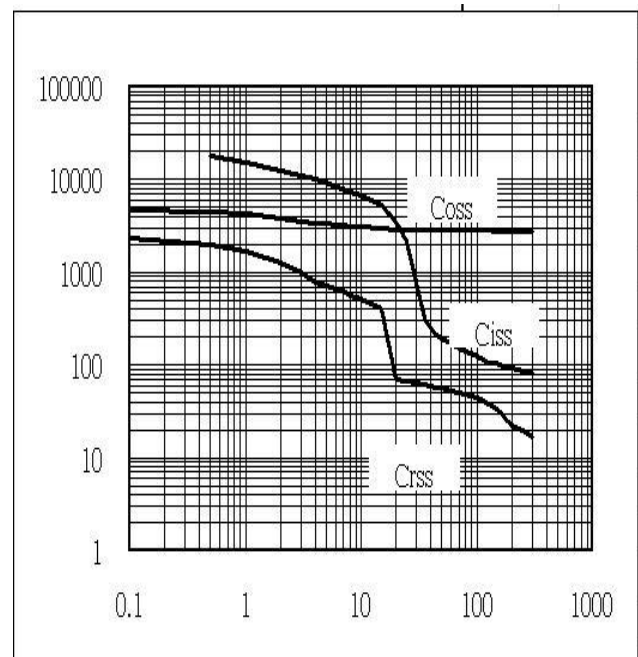


Fig 4. Typical Capacitance Vs. Drain-to-Source Voltage



TYPICAL ELECTRICAL CHARACTERISTICS

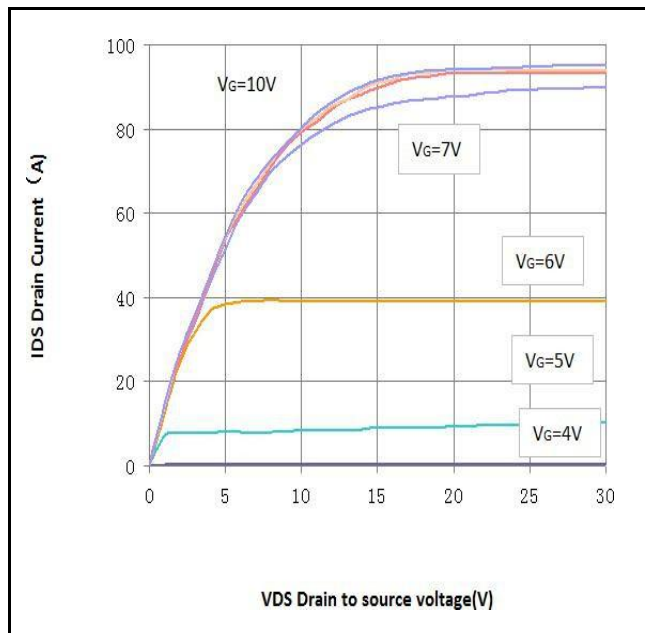


Fig 5. Typical Output Characteristics

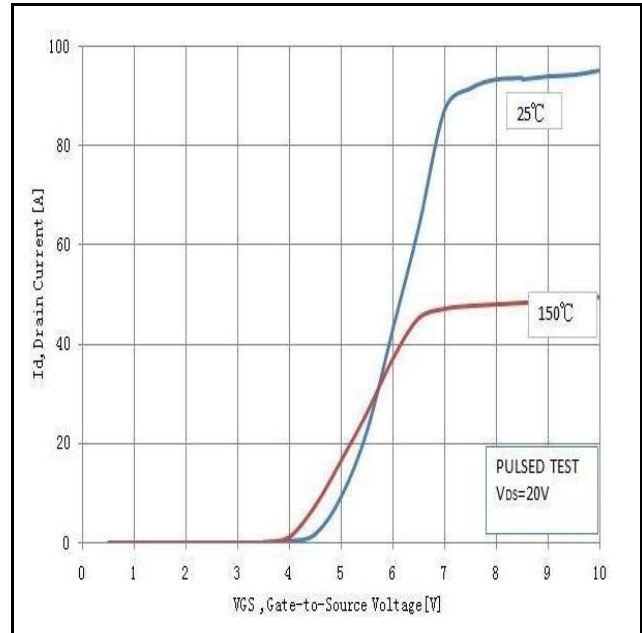


Fig 6. Typical Transfer Characteristics