GP47S60 GP47S60H

POWER FIELD EFFECT TRANSISTOR

GENERAL DESCRIPTION

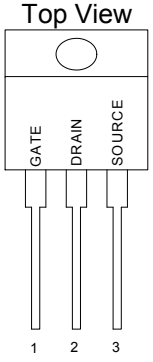
This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers 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.

FEATURES

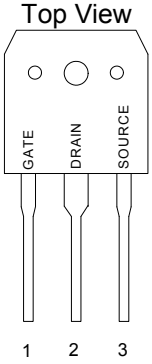
- Robust High Voltage Termination
- Avalanche Energy Specified
- Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and V_{DS}(on) Specified at Elevated Temperature
- Isolated Mounting Hole Reduces Mounting Hardware

PIN CONFIGURATION

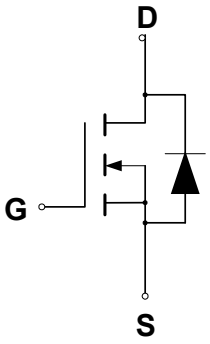
TO-220F
Top View



TO-3P/T-O247
Top View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	$I_{D\ (1)}$	47	A
— Pulsed	I_{DM}	141	
Gate-to-Source Voltage — Continue	V_{GS}	±20	V
Total Power Dissipation – TO220FP	P_D	50	W
–TO3P		446	
–TO247		417	
Derate above 25℃ – TO220FP		0.4	W/℃
–TO3P		3.57	
–TO247		2.78	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	℃
Single Pulse Drain-to-Source Avalanche Energy — T_J = 25℃ (V_{DD} = 100V, V_{GS} = 10V, I_L = 12A, L = 10mH, R_G = 25Ω)	E_{AS}	720	mJ
Thermal Resistance — Junction to Case -TO220FP	θ_{JC}	2.5	℃/W
— Junction to Case -TO3P		0.28	
— Junction to Case -TO247		0.3	
— Junction to Ambient -TO220FP	θ_{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	℃

(1) Drain current limited by maximum junction temperature

ORDERING INFORMATION

Part Number	TOP MARK	Part Number	Packing Mthod	Note
GP47S60XN220FP (Notte1)	GP47S60X	TO-220FP	Tube	
GP47S60XN3P (Notte1)	GP47S60X	TO-3P	Tube	
GP47S60XN247 (Notte1)	GP47S60X	TO-247	Tube	
GP47S60HXN220FP (Notte1)	GP47S60HX	TO-220FP	Tube	
GP47S60HXN3P (Notte1)	GP47S60HX	TO-3P	Tube	
GP47S60HXN247 (Notte1)	GP47S60HX	TO-247	Tube	

Note1: X : Suffix for Halogen Free Product,

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

			GP47S60, GP47S60H			
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}			1	uA
Gate-Source Leakage Current-Forward (V_{gsf} = 20 V, V_{DS} = 0 V)		I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse (V_{gsr} = - 20 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) *		$R_{DS(on)}$		68	81	mΩ
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		3111.9		pF
Output Capacitance		C_{oss}		2399.1		pF
Reverse Transfer Capacitance		C_{rss}		61.6		pF
Turn-On Delay Time	(V_{DD} = 300 V, I_D = 20 A, R_G = 25Ω) *	$t_{d(on)}$		45.5		ns
Rise Time		t_r		120.56		ns
Turn-Off Delay Time		$t_{d(off)}$		137.06		ns
Fall Time		t_f		116.2		ns
Total Gate Charge	(V_{DS} = 480 V, I_D = 20 A, V_{GS} = 10 V)*	Q_g		87.967		nC
Gate-Source Charge		Q_{gs}		21.758		nC
Gate-Drain Charge		Q_{gd}		41.14		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I_S = 20 A, d_{IS}/d_t = 100A/μs)	V_{SD}			1.5	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		450		ns

* Pulse Test: Pulse Width ≦300μs, Duty Cycle ≦2%

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

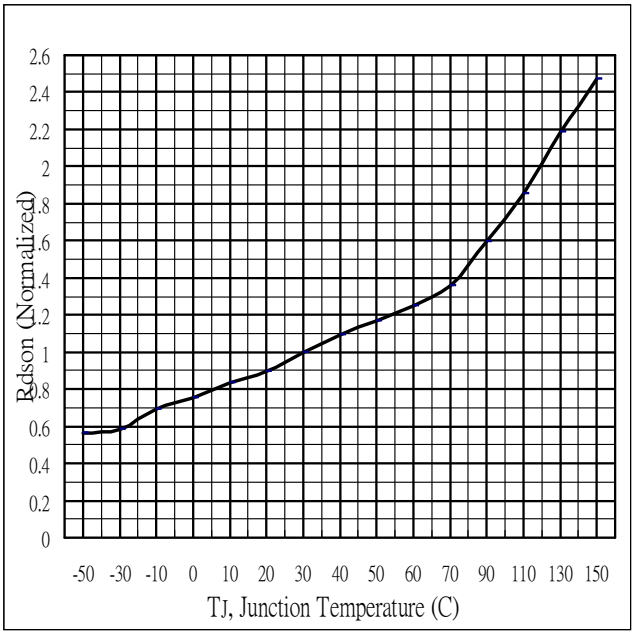


Fig 1. On-Resistance Variation with vs. Temperature

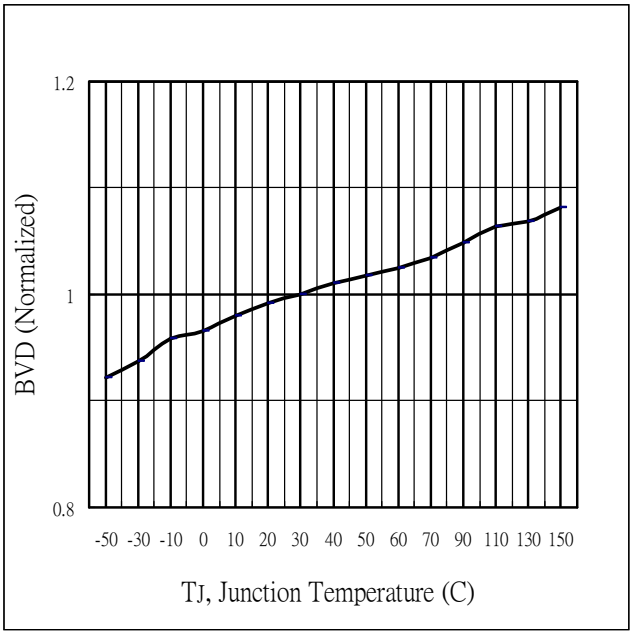


Fig.2 Breakdown Voltage Variation vs. Temperature

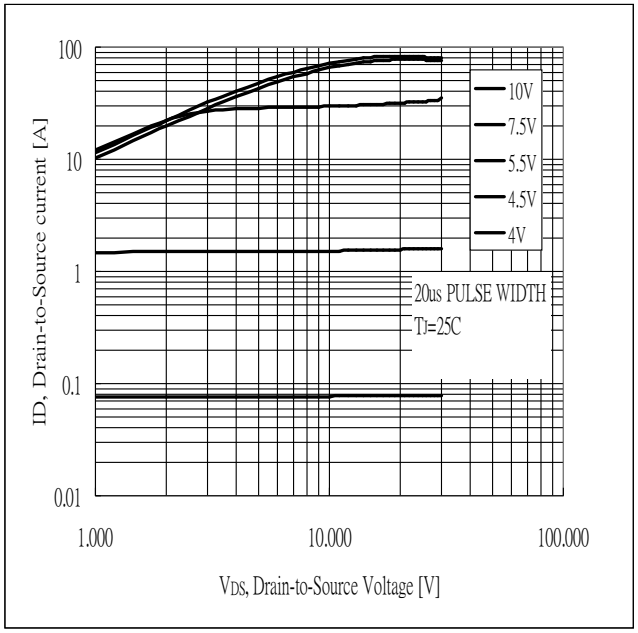


Fig 3. Typical Output Characteristics

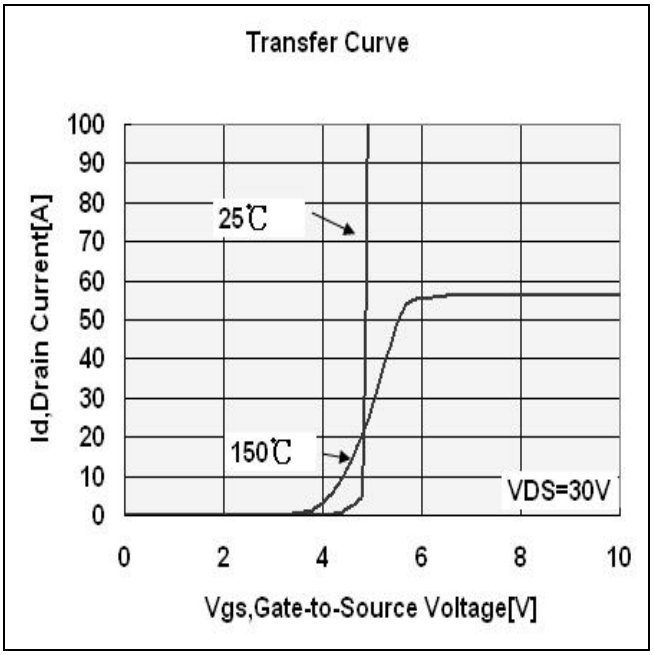


Fig 4. Typical Transfer Characteristics

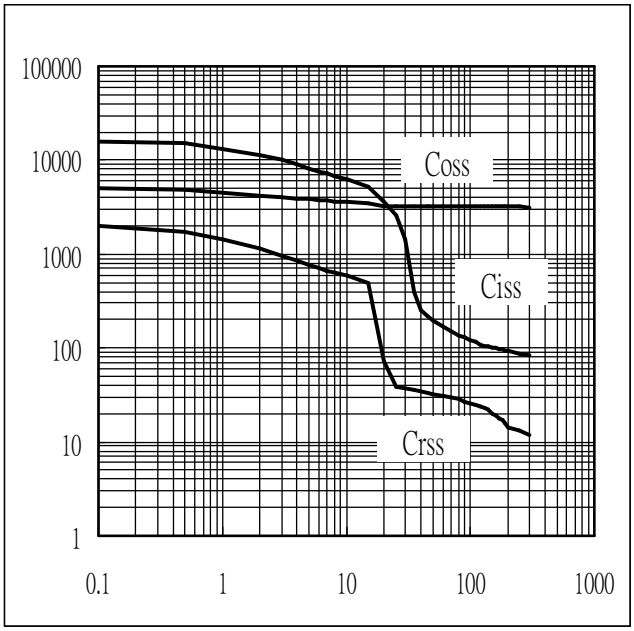


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

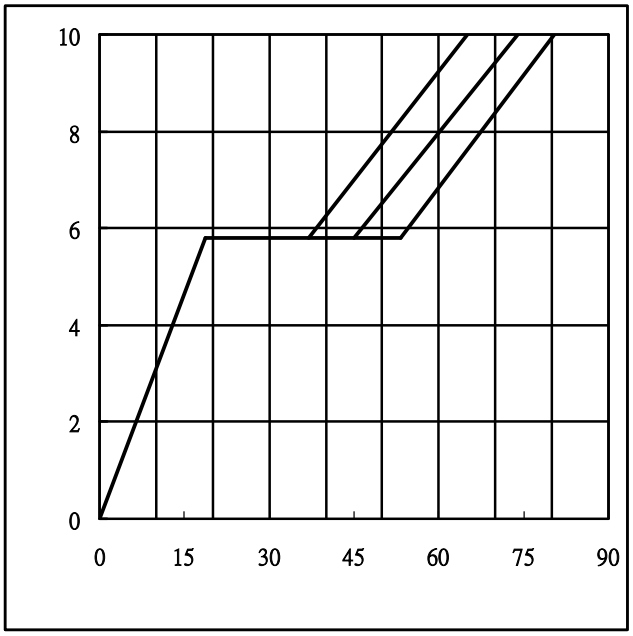


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

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