GPT16N50 / GPT16N50D

POWER FIELD EFFECT TRANSISTOR

GENERAL DESCRIPTION

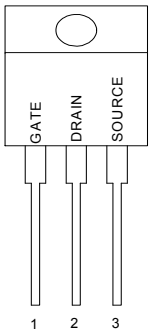
This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers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

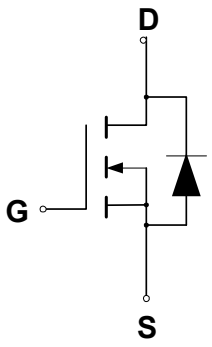
- Robust High Voltage Termination
- Avalanche Energy Specified
- Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and V_{DS}(on) Specified at Elevated Temperature
- Isolated Mounting Hole Reduces Mounting Hardware

PIN CONFIGURATION

TO220/TO-220F
Top View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	15.5	A
— Pulsed	I_{DM}	46.5	
Gate-to-Source Voltage — Continue	V_{GS}	±30	V
Total Power Dissipation – TO220	P_D	197	W
– TO220FP		49	W/℃
Derate above 25℃ – TO220		1.57	
– TO220FP		0.39	
Operating 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 = 14A, L = 10mH, R_G = 25Ω)	E_{AS}	980	mJ
Thermal Resistance — Junction to Case -TO220	θ_{JC}	0.63	℃/W
— Junction to Case -TO220FP		3.5	
— Junction to Ambient -TO220, TO220FP	θ_{JA}	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	℃
ESD SENSITIVITY — HBM, C=100pF, R=1.5kΩ	Vesd	2000	V

(1) Pulse Width and frequency is limited by TJ(max) and thermal response

ORDERING INFORMATION

Part Number	Package
GPT16N50GN220*	TO-220
GPT16N50DGN220FP*	TO-220F

***Note:** G : Suffix for PB Free Product

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

Characteristic		Symbol	GPT16N50 Min	GPT16N50 Typ	GPT16N50 Max	Units
Drain-Source Breakdown Voltage (V_{GS} = 0 V, I_D = 250 μA)		$V_{(BR)DSS}$	500			V
Drain-Source Leakage Current (V_{DS} = 500 V, V_{GS} = 0 V)		I_{DSS}			1	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)		$V_{GS(th)}$	3		5	V
Static Drain-Source On-Resistance (V_{GS} = 10 V, I_D = 8A) *		$R_{DS(on)}$			0.38	Ω
Forward Transconductance (V_{DS} = 15 V, I_D = 8A) *		g_{FS}		15		S
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		2299		pF
Output Capacitance		C_{oss}		241		pF
Reverse Transfer Capacitance		C_{rss}		16		pF
Turn-On Delay Time	(V_{DD} = 250 V, I_D = 16 A, R_G = 25Ω) *	$t_{d(on)}$		35		ns
Rise Time		t_r		65		ns
Turn-Off Delay Time		$t_{d(off)}$		84		ns
Fall Time		t_f		39.47		ns
Total Gate Charge	(V_{DS} = 400 V, I_D = 16 A, V_{GS} = 10 V)*	Q_g		49.3		nC
Gate-Source Charge		Q_{gs}		10.18		nC
Gate-Drain Charge		Q_{gd}		17.5		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I_S = 16 A, d_{IS}/d_t = 100A/μs)	V_{SD}			1.5	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		475		ns

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

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

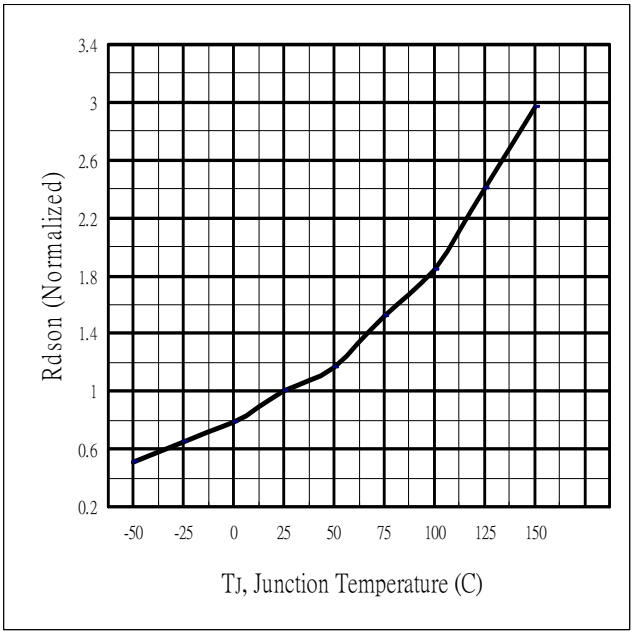


Fig 1. On-Resistance Variation with vs. Temperature

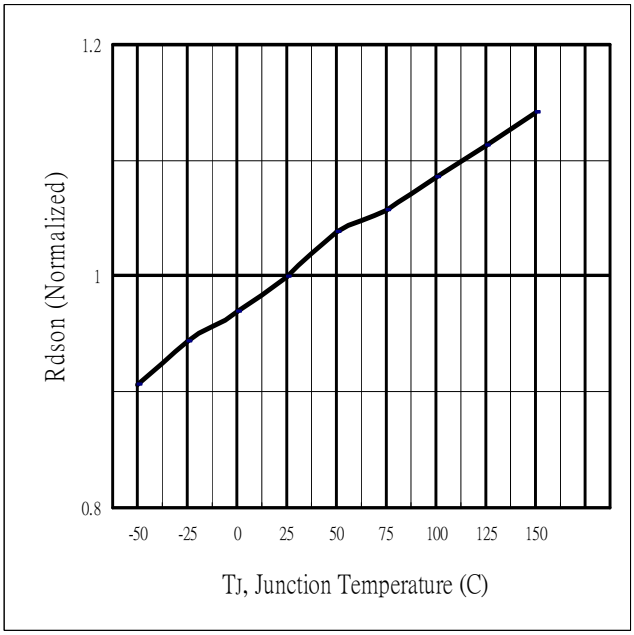


Fig.2 Breakdown Voltage Variation vs. Temperature

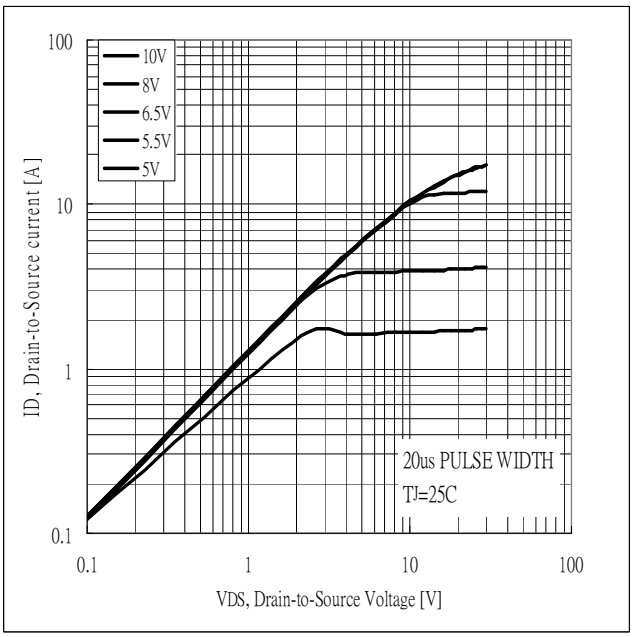


Fig 3. Typical Output Characteristics

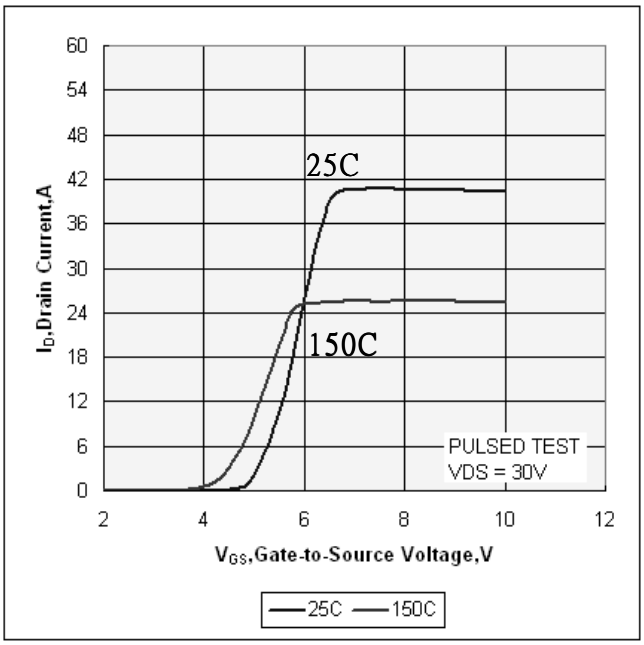


Fig 4. Typical Transfer Characteristics

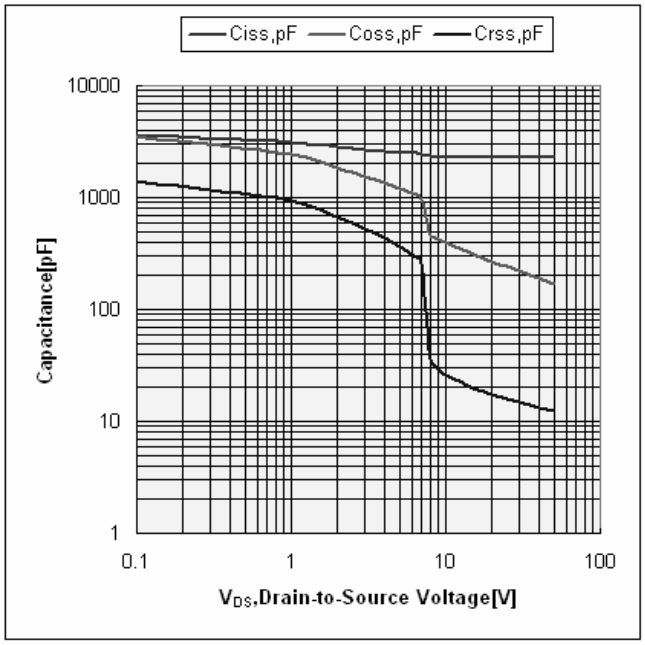


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

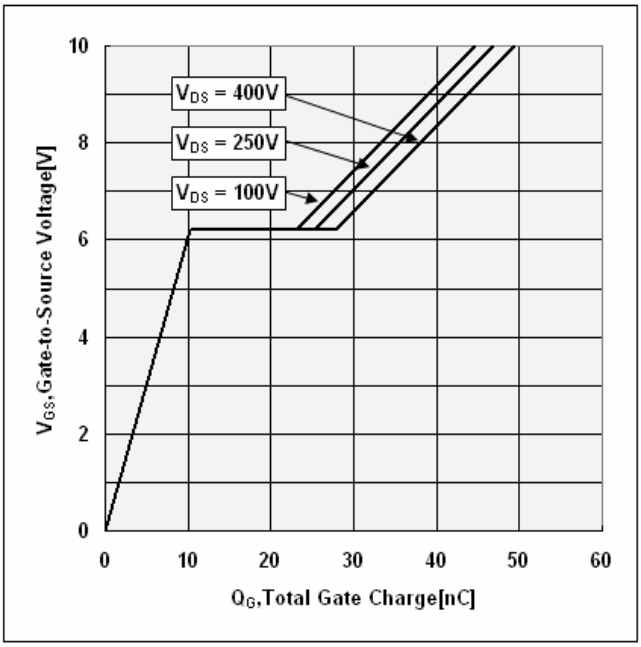
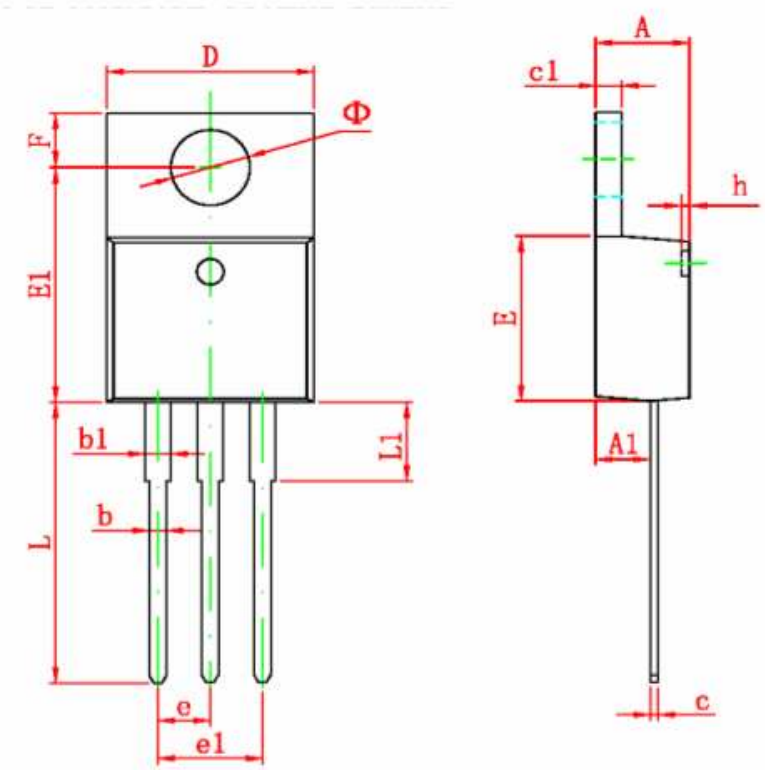


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

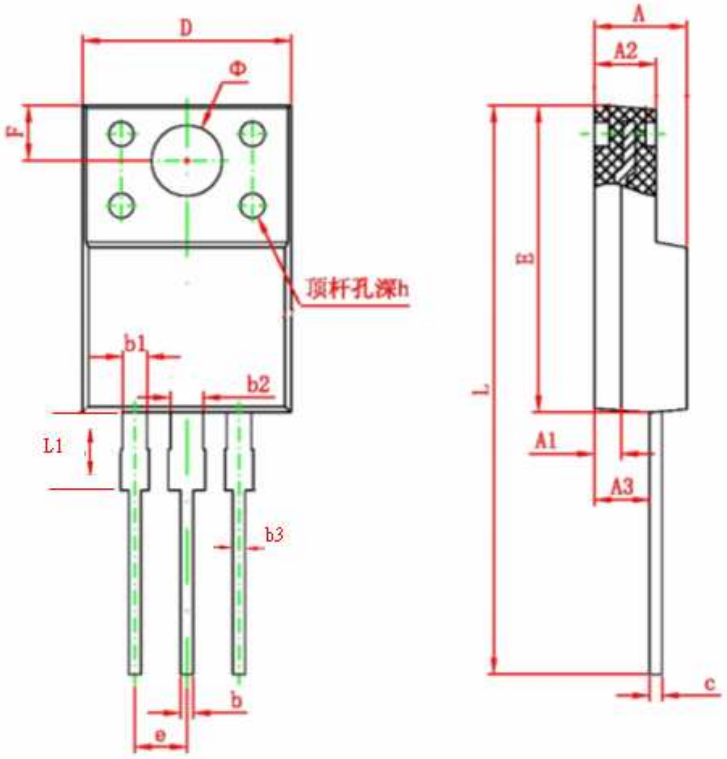
PACKAGE DIMENSION

TO-220



Symbol	Dimensions In Millimeters	
	Min.	Max
A	4.40	4.80
A1	2.10	2.84
b	0.71	0.91
b1	1.17	1.37
c	0.30	0.60
c1	1.17	1.47
D	9.40	10.60
E	8.40	9.60
e	2.54 TYP.	
e1	4.90	5.60
F	3.00 REF.	
Φ	3.50 REF.	
h	0.00	0.30
L	12.50	14.00
L1	3.50	4.00

TO-220F



Symbol	Dimensions In Millimeters	
	Min.	Max
A	3.80	4.70
A1	1.3 REF.	
A2	2.20	3.20
A3	2.10	3.20
b	0.30	0.95
b1	1.00	1.75
b2	1.00	1.75
b3	0.50	0.80
c	0.30	0.90
D	9.90	10.40
E	14.60	16.20
e	2.54 TYP.	
F	3.00 REF.	
Φ	3.50 REF.	
h	0.00	0.30
L	28.00	30.00
L1	3.20	3.55

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Shenzhen Great Power Co.,Ltd
Web:http:// www.grtpower.com

臺灣	深圳
新北市汐止區新台五路一段 96 號 21F	深圳市福田区深南大道 7002 号财富广场 A 座 4V,
21F., No. 96, Sec. 1, Sintai 5th Rd., Sijhih City, Taipei County 22102, Taiwan, R.O.C.	4V, Tower A, Fortune Plaza, No. 7002, Shennan Road, Futian District, Shenzhen City, China PC : 518040
TEL:+886-2-2696 3558	TEL:+86-755-83709176
FAX:+886-2-2696 3559	FAX:+86-755-83709276