GPT05N50

POWER FIELD EFFECT TRANSISTOR

GENERAL DESCRIPTION

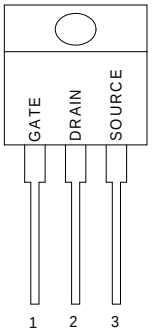
This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers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

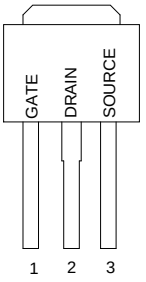
- Robust High Voltage Termination
- Avalanche Energy Specified
- Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and V_{DS}(on) Specified at Elevated Temperature

PIN CONFIGURATION

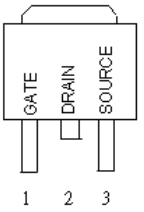
TO-220F/TO220
Top View



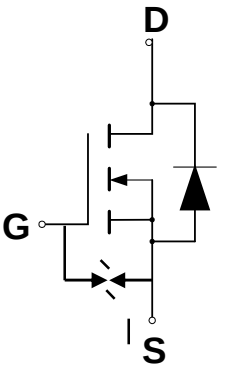
TO-251
Front View



TO-252
Front View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	4.5	A
— Pulsed	I_{DM}	13.5	
Gate-to-Source Voltage — Continue	V_{GS}	±30	V
Total Power Dissipation - TO251,252	P_D	42	W
- TO220		76	
- TO220F		24	W/℃
Derate above 25℃ - TO251,252		0.32	
- TO220		0.61	
- TO220F		0.21	
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 = 4A, L = 10mH, R_G = 25Ω)	E_{AS}	80	mJ
Thermal Resistance — Junction to Case - TO251,252	θ_{JC}	2.8	℃/W
- TO220		1.6	
- TO220F		4.8	
— Junction to Ambient - TO251,252	θ_{JA}	120	
- TO220, TO220F		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

ORDERING INFORMATION

Part Number	Package
GPT05N50GN220FP*	TO-220F
GPT05N50GN220*	TO-220
GPT05N50GN251*	TO-251
GPT05N50GN251S*	TO-251S
GPT05N50GN252*	TO-252

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

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

			GPT05N50			
Characteristic		**Symbol**	**Min**	**Typ**	**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	μA
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)		$V_{GS(th)}$	2.5	3.5	4.5	V
Static Drain-Source On-Resistance (V_{GS} = 10 V, I_D = 2.5A) *		$R_{DS(on)}$			1.55	Ω
Forward Transconductance (V_{DS} = 20 V, I_D = 2.5A) *		g_{FS}		3		S
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		528		pF
Output Capacitance		C_{oss}		52		pF
Reverse Transfer Capacitance		C_{rss}		4		pF
Turn-On Delay Time	(V_{DD} = 250 V, I_D = 5 A, R_G = 25Ω) *	$t_{d(on)}$		14.3		ns
Rise Time		t_r		15		ns
Turn-Off Delay Time		$t_{d(off)}$		29.3		ns
Fall Time		t_f		12.5		ns
Total Gate Charge	(V_{DS} = 400 V, I_D = 5 A, V_{GS} = 10 V)*	Q_g		13		nC
Gate-Source Charge		Q_{gs}		3		nC
Gate-Drain Charge		Q_{gd}		6.2		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I_S =5 A, V_{GS} = 0 V, d_{IS}/d_t = 100A/μs)	V_{SD}			1.5	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		213		ns

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

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

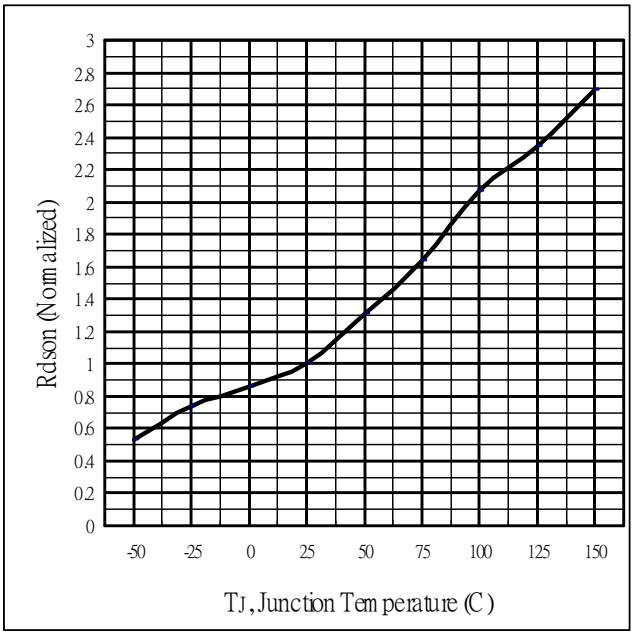


Fig 1. On-Resistance Variation with vs. Temperature

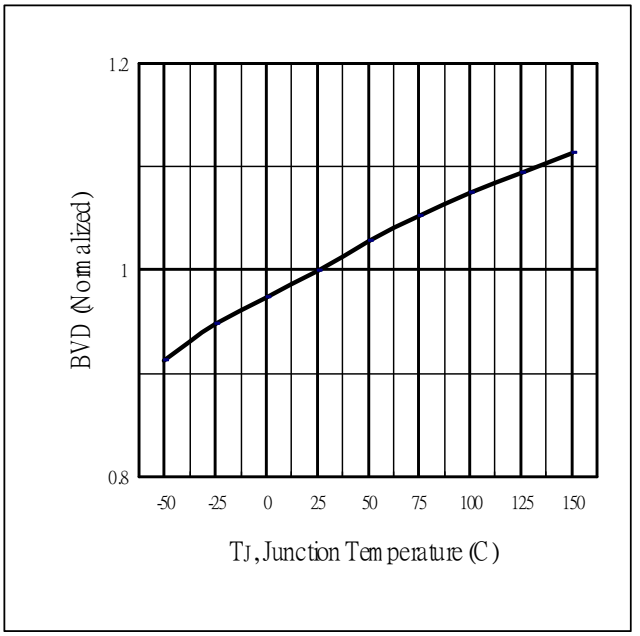


Fig.2 Breakdown Voltage Variation vs. Temperature

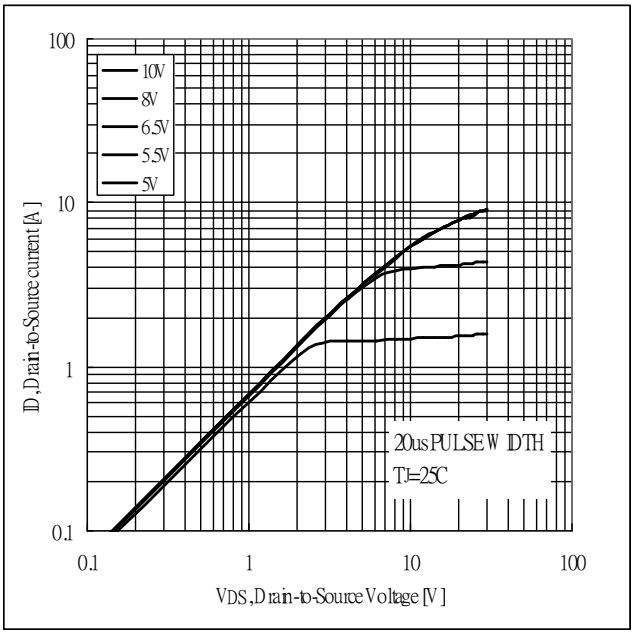


Fig 3. Typical Output Characteristics

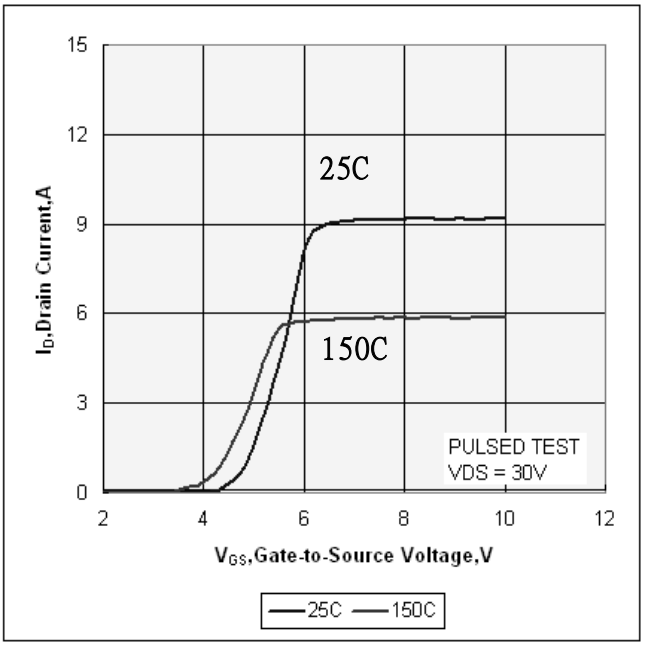


Fig 4. Typical Transfer Characteristics

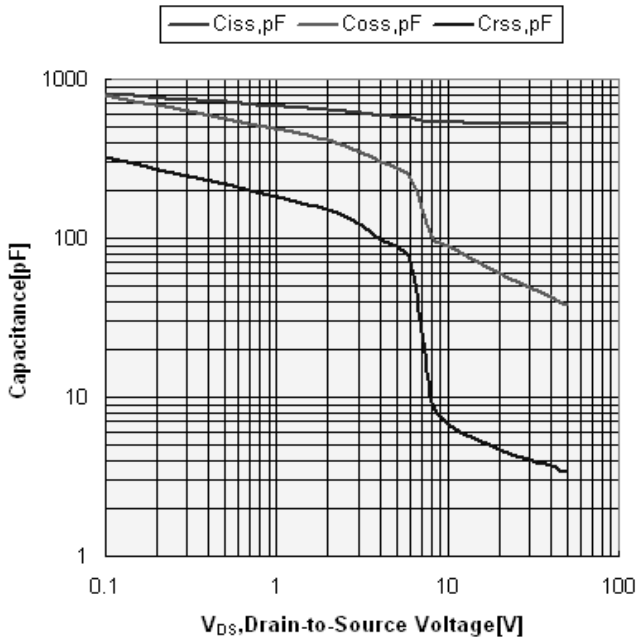


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

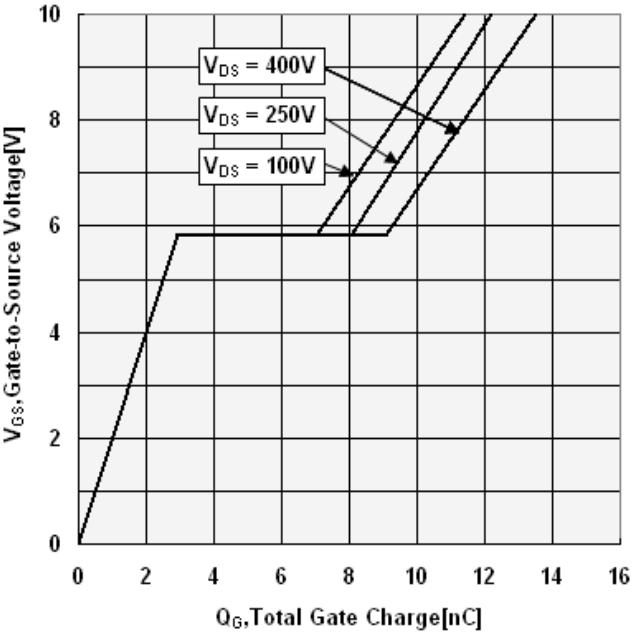
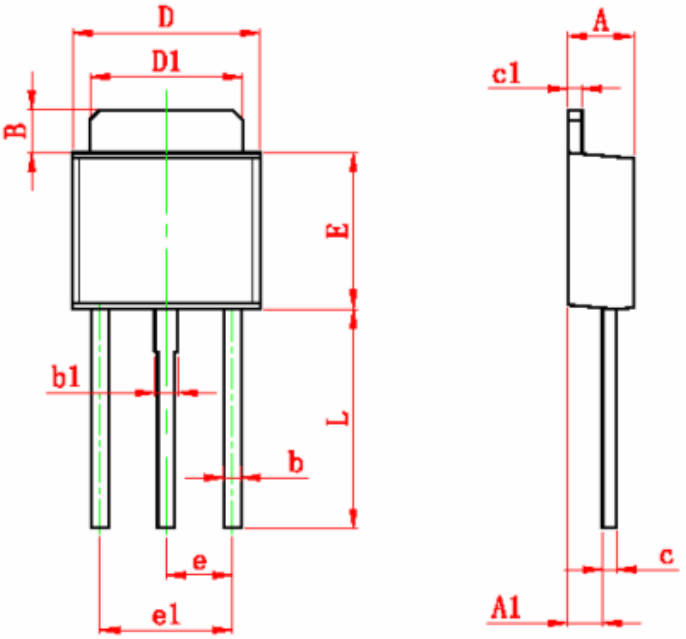


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

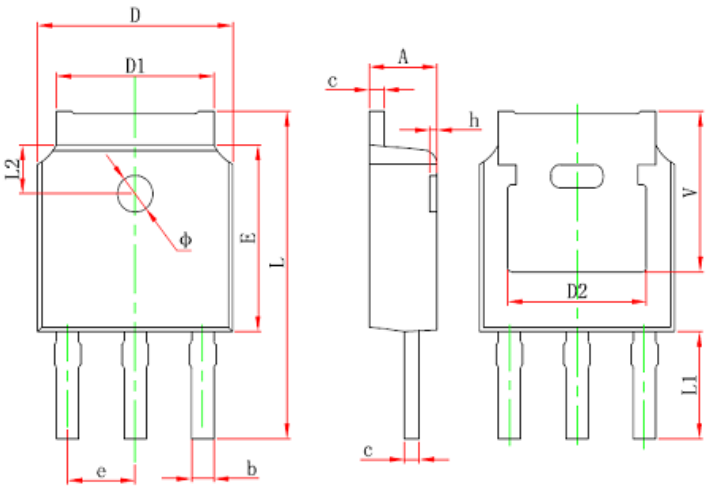
PACKAGE DIMENSION

TO-251



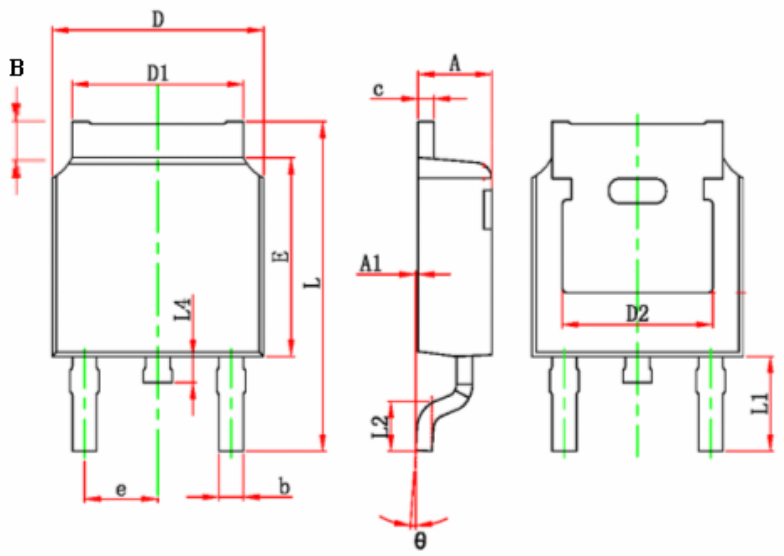
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
A1	0.90	1.35
B	0.90	1.65
b	0.45	0.75
b1	0.65	0.95
c	0.40	0.60
c1	0.40	0.60
D	6.30	6.80
D1	5.00	5.50
E	5.40	6.30
e	2.3 TYP.	
e1	4.40	4.80
L	7.40	8.00

TO-251S



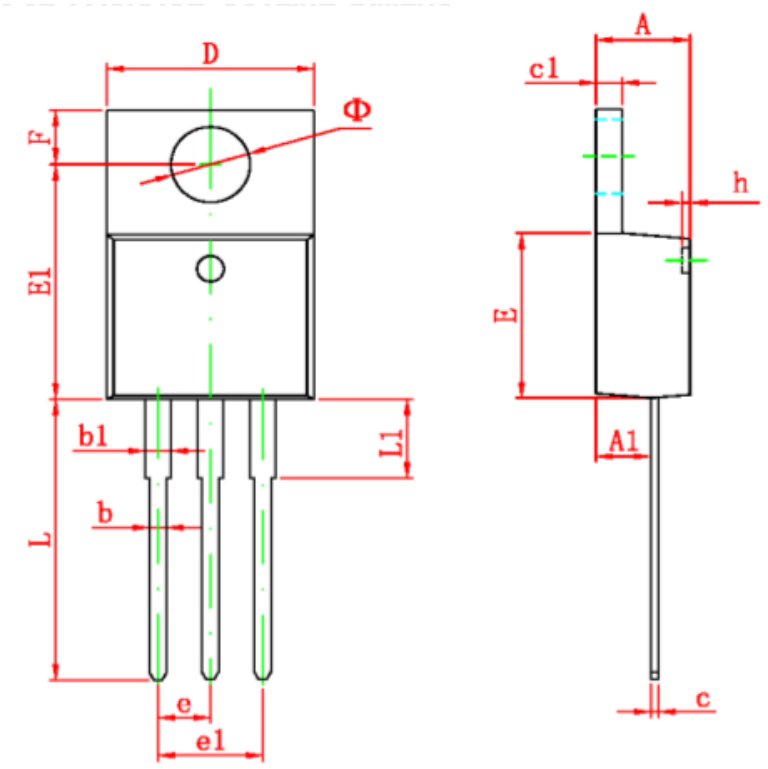
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
b	0.64	0.90
c	0.44	0.60
D	6.30	6.90
D1	5.00	5.50
D2	4.83 TYP.	
E	5.80	6.40
e	2.286 TYP.	
L1	3.5 TYP.	
L2	1.6 TYP.	
Φ	1.2 TYP.	
h	0.00	0.30
V	5.35 TYP.	

TO-252



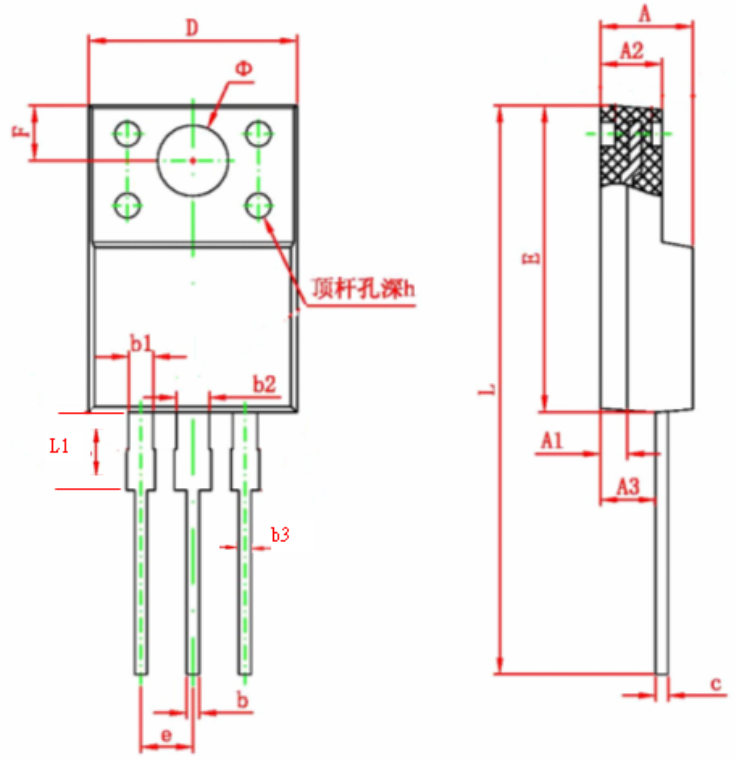
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
A1	0.90	1.35
B	0.90	1.65
b	0.45	0.90
c	0.40	0.60
D	6.30	6.80
D1	5.00	5.50
D2	4.83 TYP.	
E	5.90	6.30
e	2.3 TYP.	
L	9.30	10.50
L2	1.20	1.80
L4	0.60	1.00
θ	0.00	10.00

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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