GPT04N70

POWER FIELD EFFECT TRANSISTOR

GENERAL DESCRIPTION

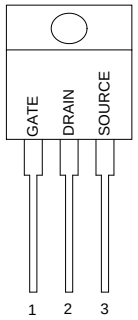
This advanced high voltage MOSFET is designed to withstand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode with fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, converters, power motor controls and bridge circuits.

FEATURES

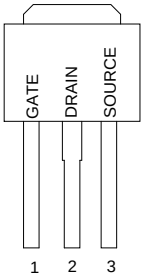
- Higher Current Rating
- Lower Rds(on)
- Lower Capacitances
- Lower Total Gate Charge
- Tighter VSD Specifications
- Avalanche Energy Specified

PIN CONFIGURATION

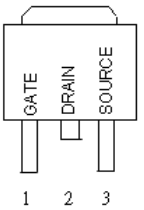
TO-220/TO-220FP Top View



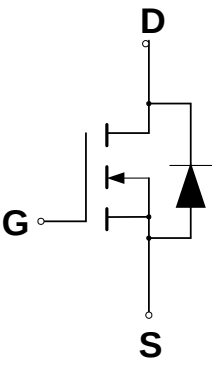
TO-251 Top View



TO-252 Top View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	3.5	A
— Pulsed	I_{DM}	10.5	
Gate-to-Source Voltage — Continue	V_{GS}	±30	V
Total Power Dissipation TO-251/TO-252	P_D	50	W
TO-220		84	
TO-220FP		28	W/℃
Derate above 25℃ TO-251/TO-252		0.4	
TO-220		0.8	
TO-220FP		0.26	
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 = 3 A, L = 10mH, R_G = 25Ω)	E_{AS}	45	mJ
Thermal Resistance — Junction to Case TO-251/TO-252	θ_{JC}	2.6	℃/W
TO-220		1.3	
TO220FP	θ_{JA}	4.3	
— Junction to Ambient TO-251/TO-252		120	
TO-220, TO-220FP		62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	℃

ORDERING INFORMATION

Part Number	Package
GPT04N70GN220*	TO-220
GPT04N70GN220FP*	TO-220 Full Package
GPT04N70GN251*	TO-251
GPT04N70GN252*	TO-252

***Note:** G : Suffix for Pb Free Product
X : Suffix for Halogen and Pb Free Product

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

			GPT04N70			
Characteristic		**Symbol**	**Min**	**Typ**	**Max**	**Units**
Drain-Source Breakdown Voltage (V_{GS} = 0 V, I_D = 250 μA)		$V_{(BR)DSS}$	700			V
Drain-Source Leakage Current (V_{DS} =700 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)		$V_{GS(th)}$	2.5	3.5	4.5	V
Static Drain-Source On-Resistance (V_{GS} = 10 V, I_D = 2.0A) *		$R_{DS(on)}$			3.8	Ω
Forward Transconductance (V_{DS} = 15 V, I_D = 2.0 A) *		g_{FS}		3		S
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		572		pF
Output Capacitance		C_{oss}		42.8		pF
Reverse Transfer Capacitance		C_{rss}		2.3		pF
Turn-On Delay Time	(V_{DD} = 350 V, I_D = 4.0 A, V_{GS} = 10 V, R_G = 9.1Ω) *	$t_{d(on)}$		18.8		ns
Rise Time		t_r		15.7		ns
Turn-Off Delay Time		$t_{d(off)}$		30.7		ns
Fall Time		t_f		17.87		ns
Total Gate Charge	(V_{DS} = 560 V, I_D = 4.0 A, V_{GS} = 10 V)*	Q_g		13.8		nC
Gate-Source Charge		Q_{gs}		3.31		nC
Gate-Drain Charge		Q_{gd}		6.16		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I_S = 4.0 A, dI_S/d_t = 100A/μs)	V_{SD}			1.5	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		260		ns

* Pulse Test: Pulse Width ≦300μs, Duty Cycle ≦2%
** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

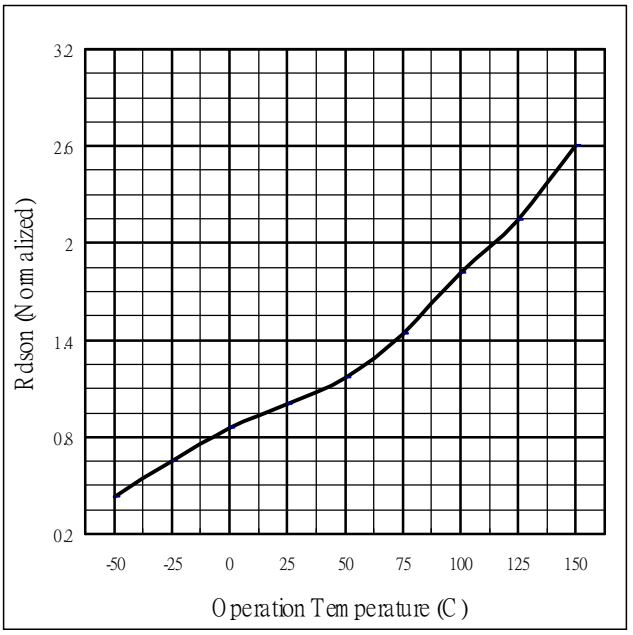


Fig 1. On-Resistance Variation with vs. Temperature

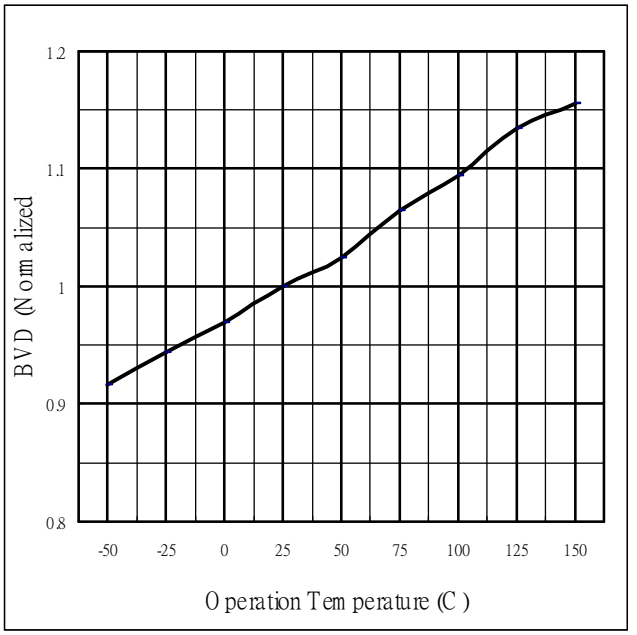


Fig.2 Breakdown Voltage Variation vs. Temperature

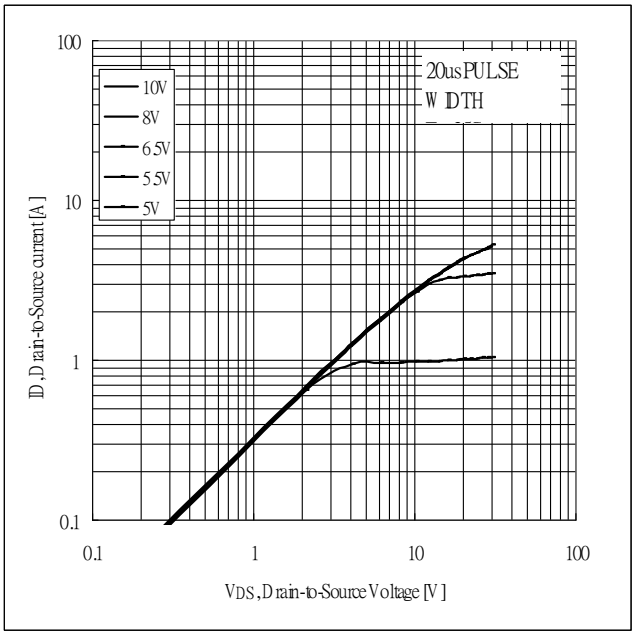


Fig 3. Typical Output Characteristics

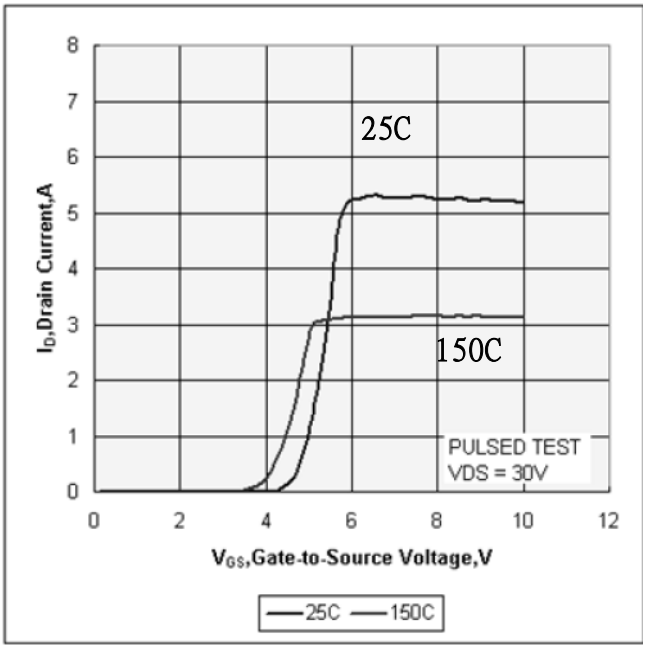


Fig 4. Typical Transfer Characteristics

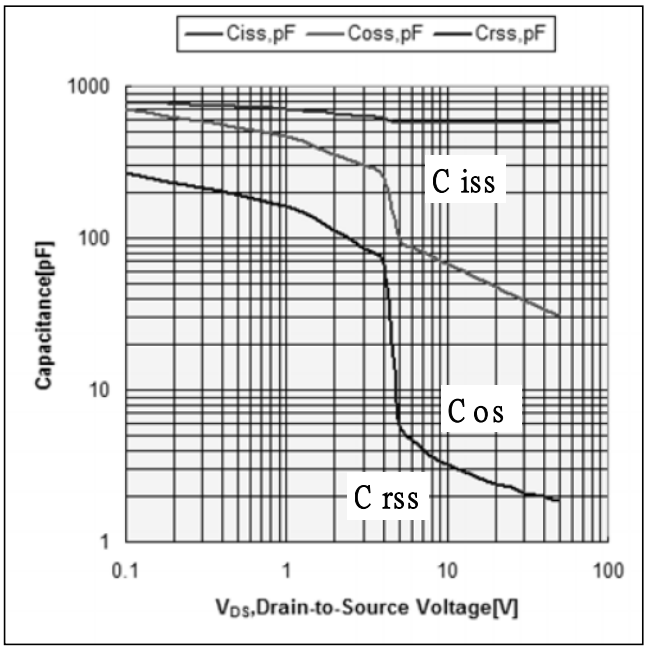


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

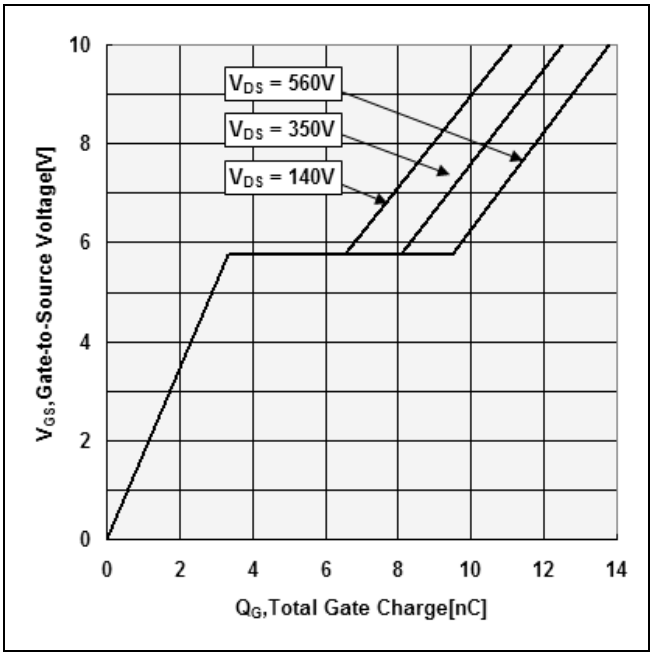
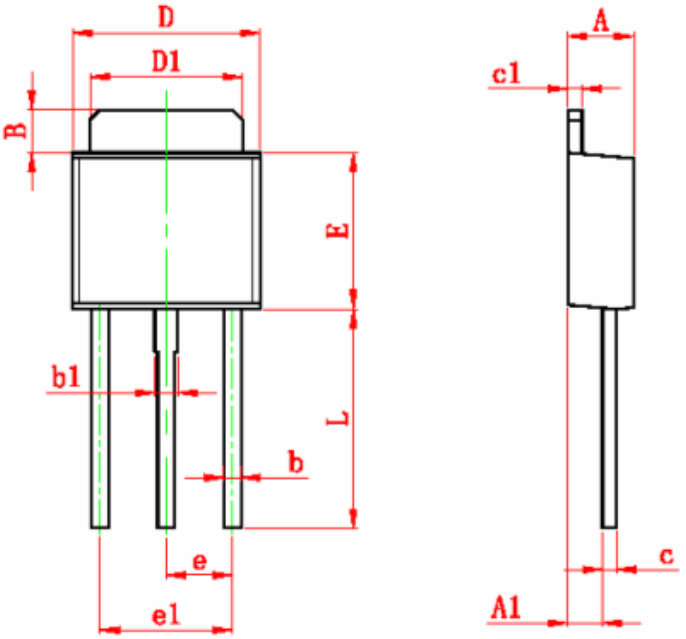


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

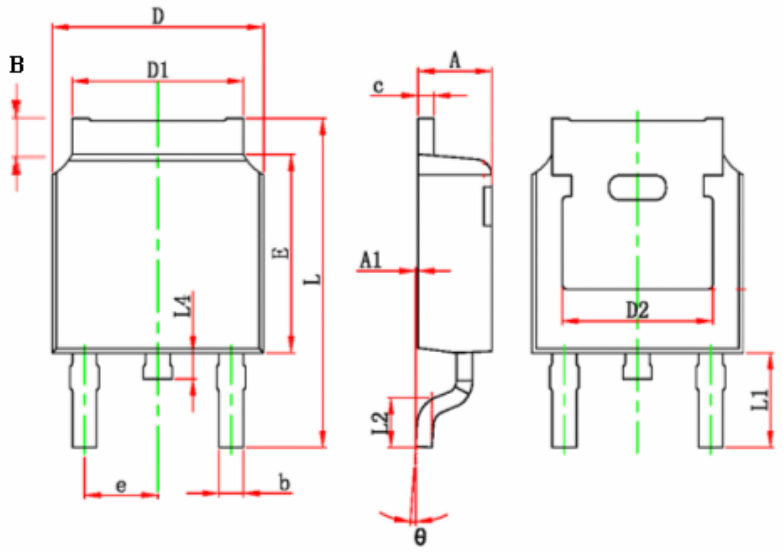
PACKAGE DIMENSION

TO-251



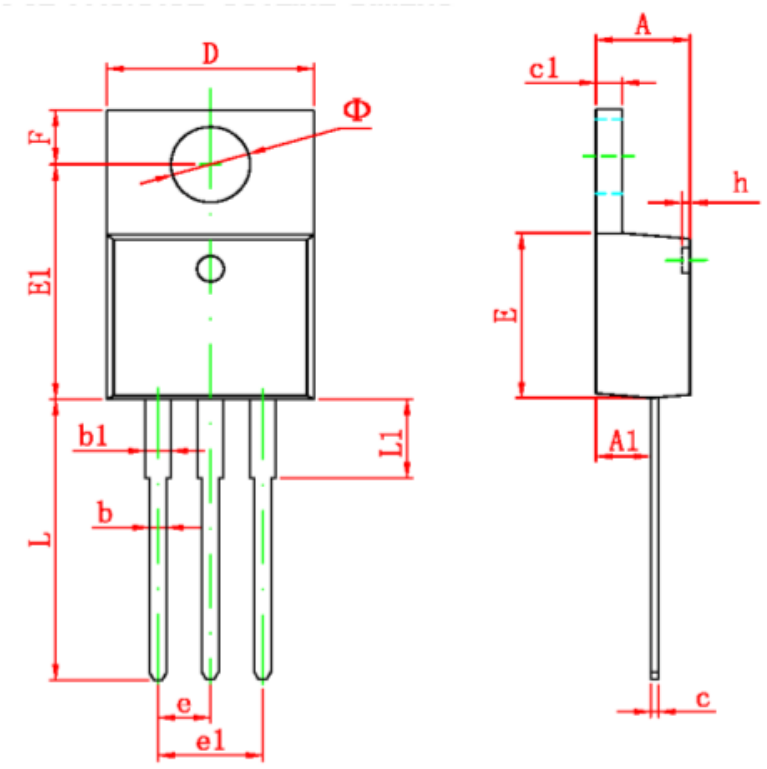
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
A1	0.90	1.35
B	0.90	1.65
b	0.45	0.75
b1	0.65	0.95
c	0.40	0.60
c1	0.40	0.60
D	6.30	6.80
D1	5.00	5.50
E	5.40	6.30
e	2.3 TYP.	
e1	4.40	4.80
L	7.40	8.00

TO-252



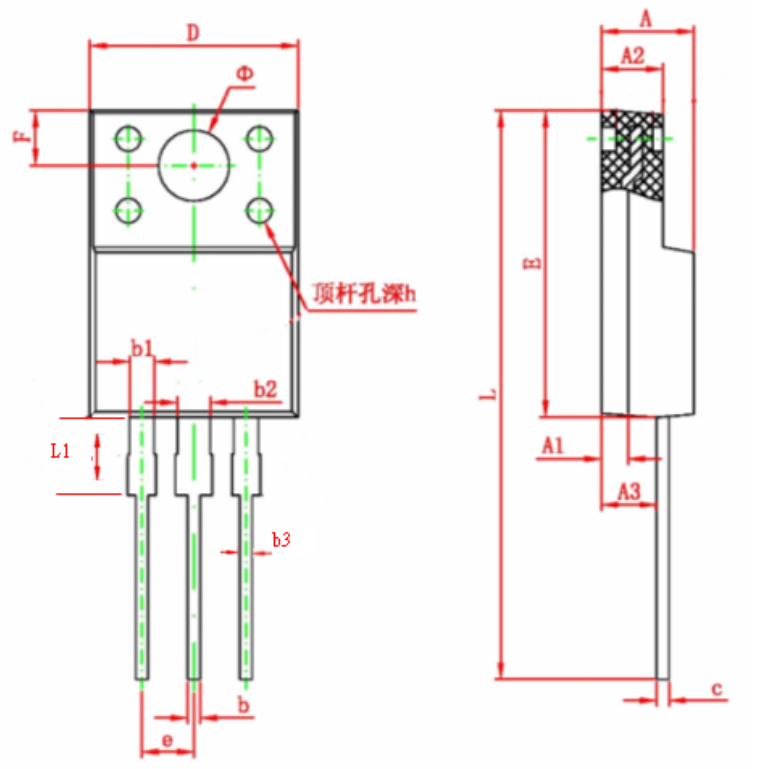
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
A1	0.90	1.35
B	0.90	1.65
b	0.45	0.90
c	0.40	0.60
D	6.30	6.80
D1	5.00	5.50
D2	4.83 TYP.	
E	5.90	6.30
e	2.3 TYP.	
L	9.30	10.50
L2	1.20	1.80
L4	0.60	1.00
θ	0.00	10.00

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-220FP



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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