

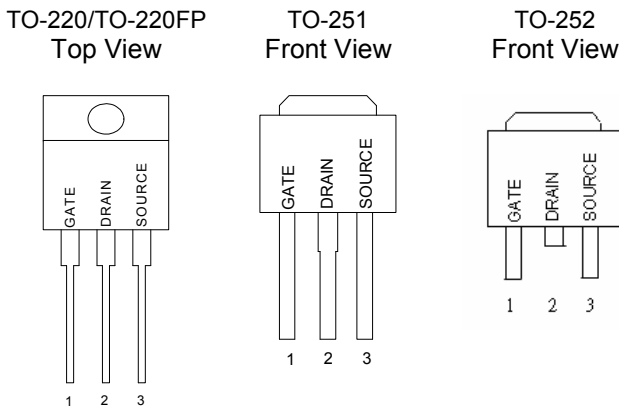
GENERAL DESCRIPTION

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.

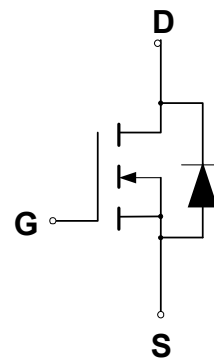
FEATURES

- ◆ Higher Current Rating
- ◆ Lower $R_{ds(on)}$
- ◆ Lower Capacitances
- ◆ Lower Total Gate Charge
- ◆ Tighter VSD Specifications
- ◆ Avalanche Energy Specified

PIN CONFIGURATION



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	49	W
TO-220		81	
TO-220FP	27.5	W/°C	
Derate above 25°C TO-251/TO-252	0.39		
TO-220	0.71		
TO-220FP	0.24		
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{V}, V_{GS} = 10\text{V}, I_L = 3\text{A}, L = 10\text{mH}, R_G = 25\Omega$)	E_{AS}	45	mJ
Thermal Resistance – Junction to Case TO-251/TO-252	θ_{JC}	2.58	°C/W
TO-220		1.4	
TO220FP		4.5	
– Junction to Ambient TO-251/TO-252	θ_{JA}	120	
TO-220, TO-220FP		62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	°C

ORDERING INFORMATION

Part Number	Package
GPT04N65GN220*	TO-220
GPT04N65GN220FP*	TO-220 Full Package
GPT04N65GN251*	TO-251
GPT04N65GN252*	TO-252

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

ELECTRICAL CHARACTERISTICS

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

Characteristic		Symbol	GPT04N65			Units
			Min	Typ	Max	
Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$)		$V_{(BR)DSS}$	650			V
Drain-Source Leakage Current ($V_{DS} = 650\text{ V}$, $V_{GS} = 0\text{ V}$)		I_{DSS}			1	μA
Gate-Source Leakage Current-Forward ($V_{gsf} = 30\text{ V}$, $V_{DS} = 0\text{ V}$)		I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse ($V_{gsr} = -30\text{ V}$, $V_{DS} = 0\text{ V}$)		I_{GSSR}			100	nA
Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$)		$V_{GS(th)}$	2.5	3.5	4.5	V
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ V}$, $I_D = 2.0\text{A}$) *		$R_{DS(on)}$			3	Ω
Forward Transconductance ($V_{DS} = 15\text{ V}$, $I_D = 2.0\text{ A}$) *		g_{FS}		3		S
Input Capacitance	$(V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$)	C_{iss}		606		pF
Output Capacitance		C_{oss}		54		pF
Reverse Transfer Capacitance		C_{rss}		4.7		pF
Turn-On Delay Time	$(V_{DD} = 325\text{ V}$, $I_D = 4.0\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 9.1\Omega$) *	$t_{d(on)}$		15		ns
Rise Time		t_r		16.5		ns
Turn-Off Delay Time		$t_{d(off)}$		34		ns
Fall Time		t_f		18		ns
Total Gate Charge	$(V_{DS} = 520\text{ V}$, $I_D = 4.0\text{ A}$, $V_{GS} = 10\text{ V}$) *	Q_g		14.5		nC
Gate-Source Charge		Q_{gs}		3.49		nC
Gate-Drain Charge		Q_{gd}		6.43		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	$(I_S = 4.0\text{ A}$, $dI_S/dt = 100\text{A}/\mu\text{s}$)	V_{SD}			1.5	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		254.7		ns

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

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

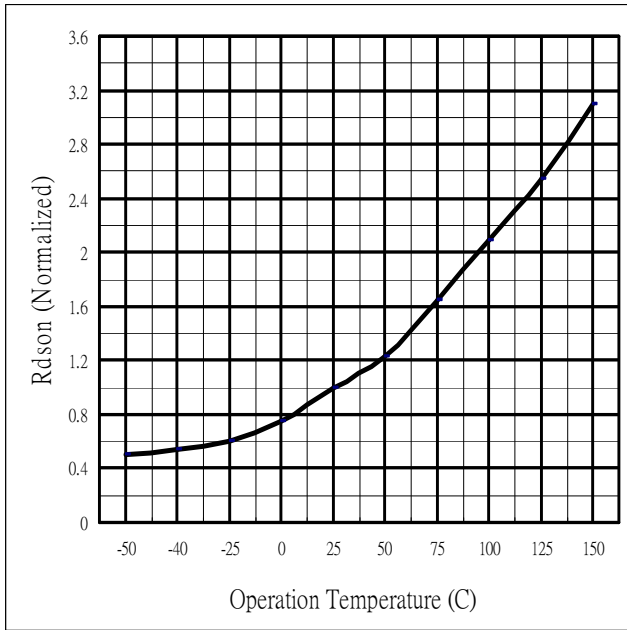


Fig 1. On-Resistance Variation with vs. Temperature

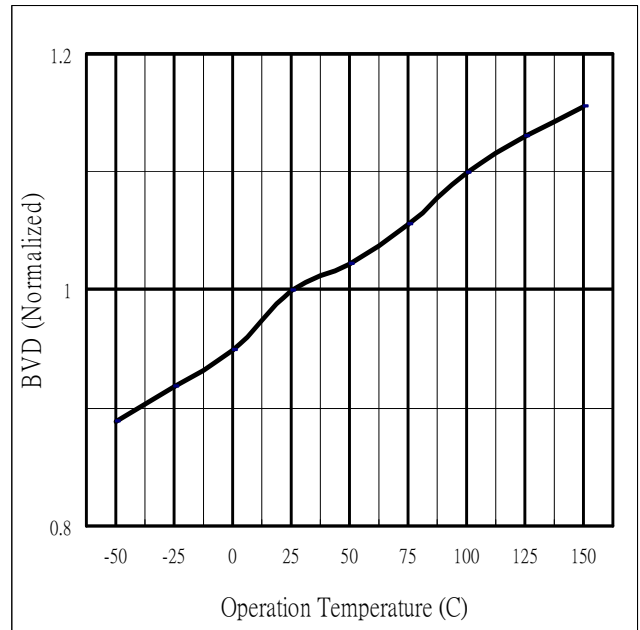


Fig.2 Breakdown Voltage Variation vs. Temperature

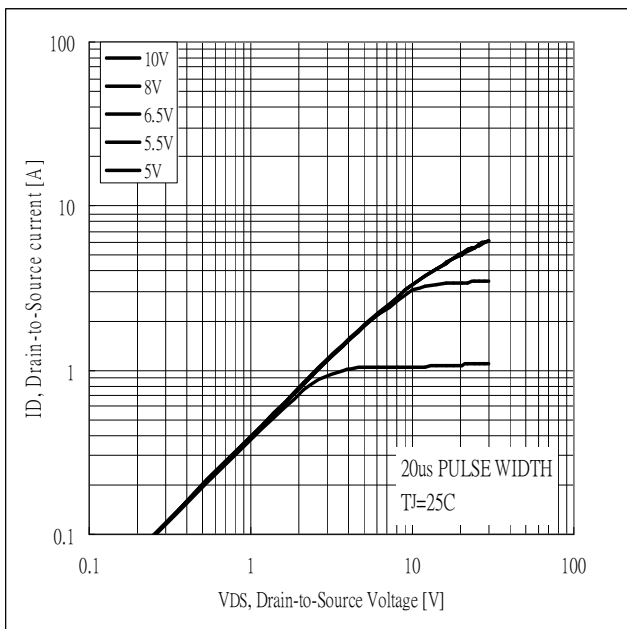


Fig 3. Typical Output Characteristics

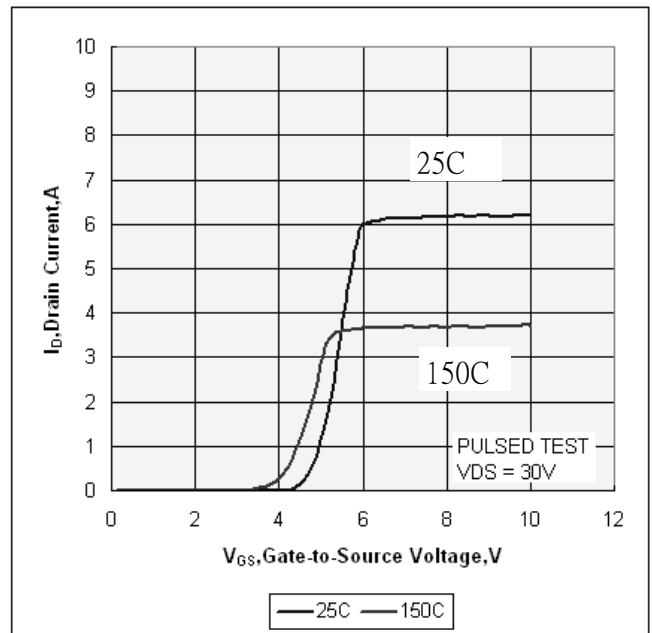


Fig 4. Typical Transfer Characteristics

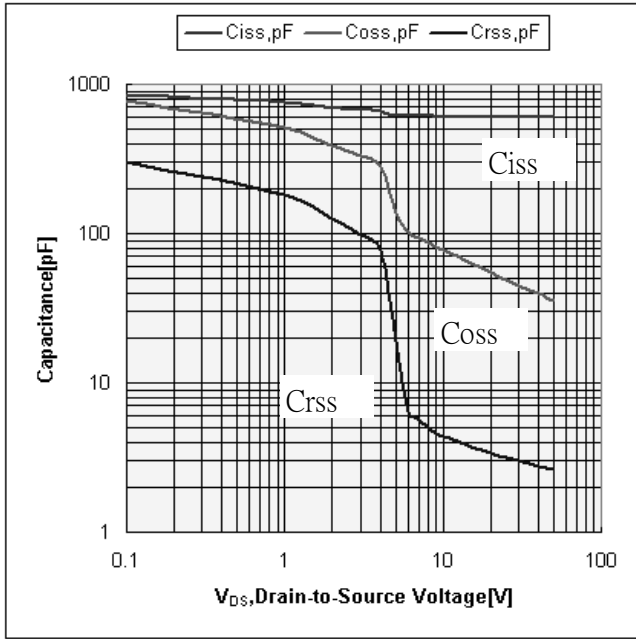


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

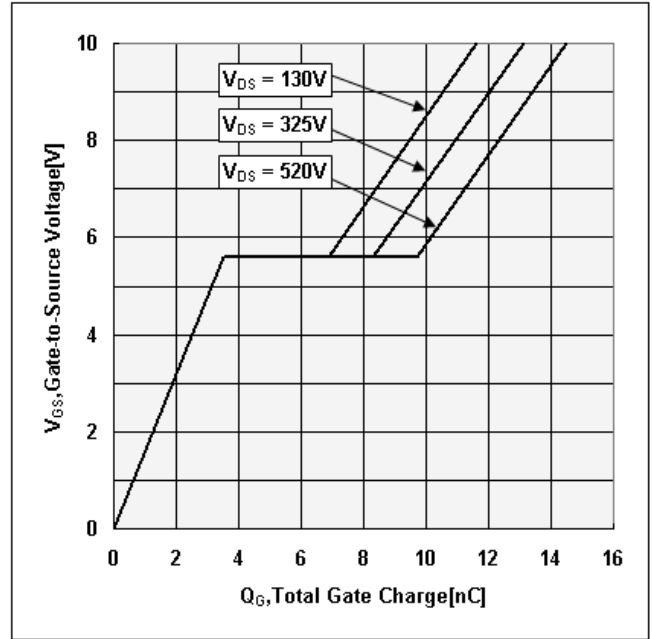
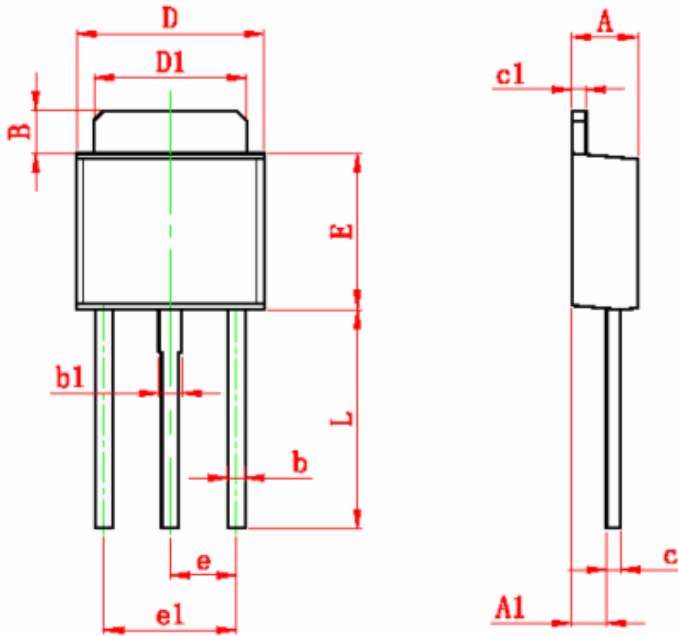


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

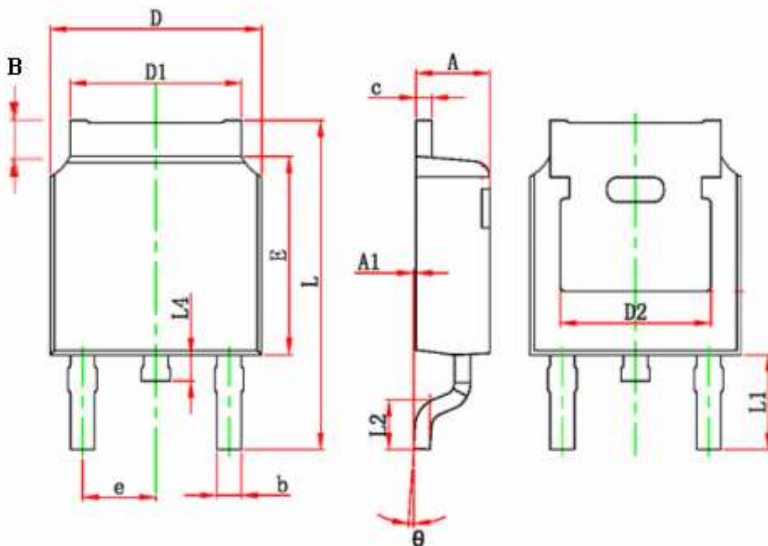
PACKAGE DIMENSION

TO-251



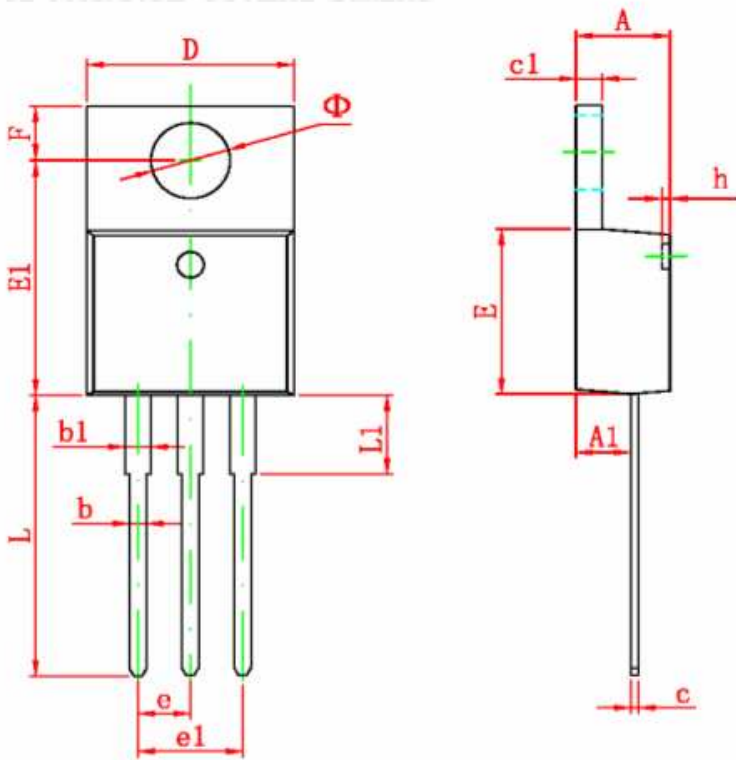
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
A1	0.90	1.35
B	0.90	1.65
b	0.45	0.75
b1	0.65	0.95
c	0.40	0.60
c1	0.40	0.60
D	6.30	6.80
D1	5.00	5.50
E	5.40	6.30
e	2.3 TYP.	
e1	4.40	4.80
L	7.40	8.00

TO-252



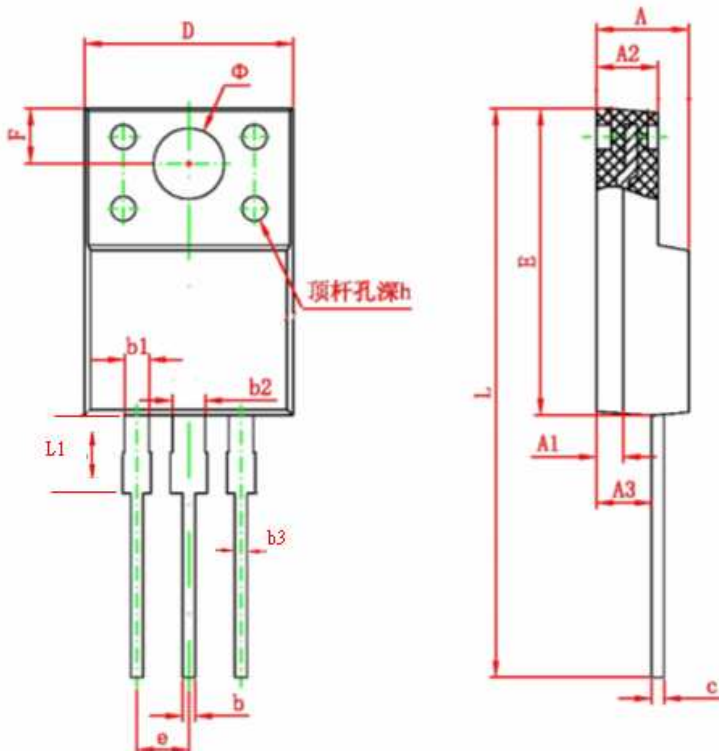
Symbol	Dimensions In Millimeters	
	Min.	Max
A	2.10	2.50
A1	0.90	1.35
B	0.90	1.65
b	0.45	0.90
c	0.40	0.60
D	6.30	6.80
D1	5.00	5.50
D2	4.83 TYP.	
E	5.90	6.30
e	2.3 TYP.	
L	9.30	10.50
L2	1.20	1.80
L4	0.60	1.00
θ	0.00	10.00

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

IMPORTANT NOTICE

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