

GENERAL DESCRIPTION

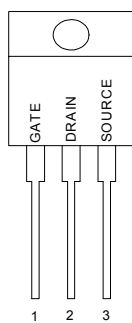
This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers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

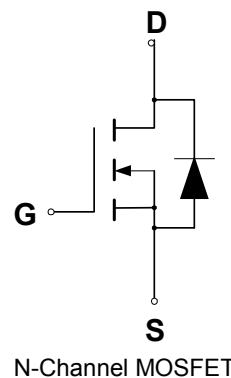
- ◆ Reduced Gate Charge
- ◆ Ultra Low On-Resistance Provides Higher Efficiency
- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆ I_{BSS} and $V_{DS(on)}$ Specified at Elevated Temperature

PIN CONFIGURATION

TO-220/TO-220FP
Front View



SYMBOL



ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current – Continuous	I_D	9.5	A
– Pulsed	I_{DM}	28.5	
Gate-to-Source Voltage – Continue	V_{GS}	±30	V
Total Power Dissipation – TO220	P_D	185	W
– TO220FP		48	
Derate above 25°C – TO220		1.45	W/°C
– TO220FP		0.38	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{V}, V_{GS} = 10\text{V}, I_L = 8\text{A}, L = 10\text{mH}, R_G = 25\Omega$)	E_{AS}	320	mJ
Thermal Resistance – Junction to Case -TO220	θ_{JC}	0.7	°C/W
– Junction to Case -TO220FP		3.4	
– 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	°C

ORDERING INFORMATION

Part Number	Package
GPT10N60GN220	TO-220
GPT10N60DGN220FP	TO-220 Full Package

*Note: G : Suffix for Pb Free Product

ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	GPT10N60			Units
		Min	Typ	Max	
Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$)	$V_{(BR)DSS}$	600			V
Drain-Source Leakage Current ($V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$)	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 ($V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$)	$V_{GS(th)}$	3	4	5	V
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ V}, I_D = 5\text{A}$) *	$R_{DS(on)}$			0.76	Ω
Forward Transconductance ($V_{DS} = 15\text{ V}, I_D = 5\text{A}$) *	g_{FS}		8		S
Input Capacitance	$(V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz})$	C_{iss}	1467		pF
Output Capacitance		C_{oss}	135		pF
Reverse Transfer Capacitance		C_{rss}	9.3		pF
Turn-On Delay Time		$(V_{DD} = 300\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}, R_G = 9.1\Omega) *$	$t_{d(on)}$	26.6	
Rise Time	t_r		20.8		ns
Turn-Off Delay Time	$t_{d(off)}$		48		ns
Fall Time	t_f		25.6		ns
Total Gate Charge	$(V_{DS} = 480\text{ V}, I_D = 10\text{ A}, V_{GS} = 10\text{ V}) *$	Q_g	32.4		nC
Gate-Source Charge		Q_{gs}	6.61		nC
Gate-Drain Charge		Q_{gd}	12.7		nC
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage(1)	$(I_S = 10\text{A}, V_{GS} = 0\text{ V}, d_{is}/d_i = 100\text{A}/\mu\text{s})$	V_{SD}		1.5	V
Forward Turn-On Time		t_{on}	**		ns
Reverse Recovery Time		t_{rr}	412		ns

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

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

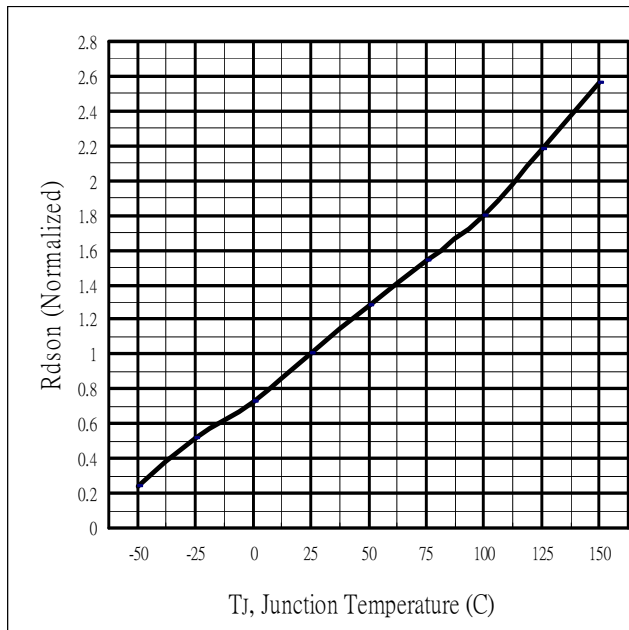


Fig 1. On-Resistance Vs. Temperature

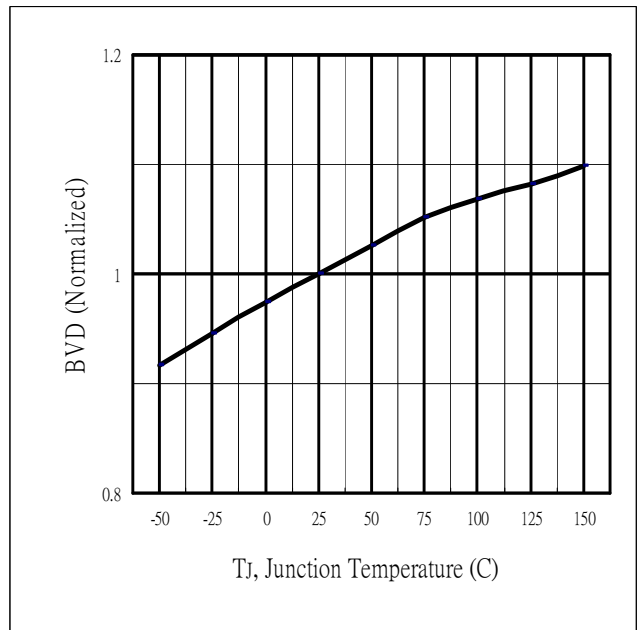


Fig.2 Breakdown Voltage Variation vs. Temperature

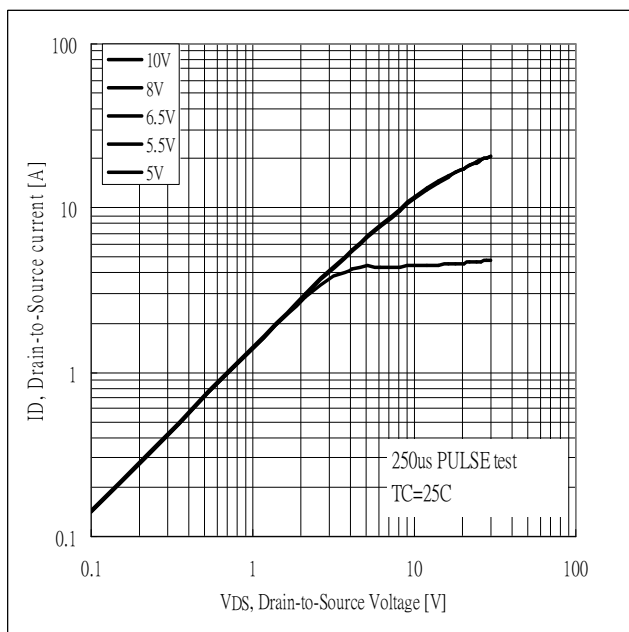


Fig 3. Typical Output Characteristics

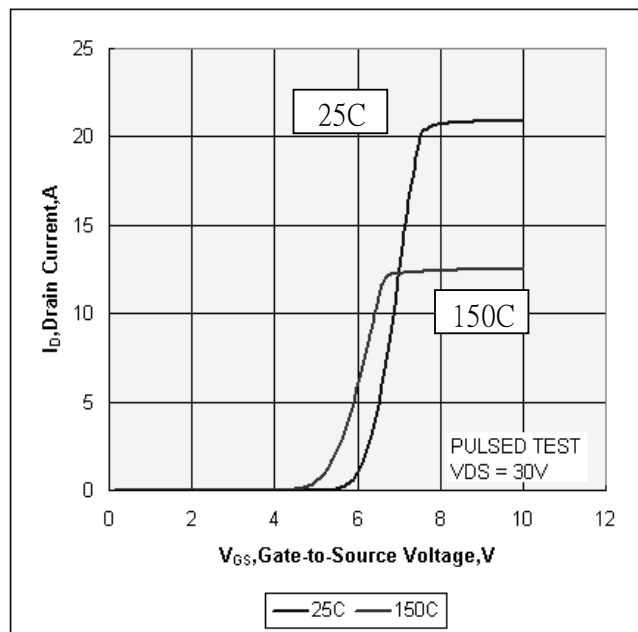


Fig 4. Typical Transfer Characteristics

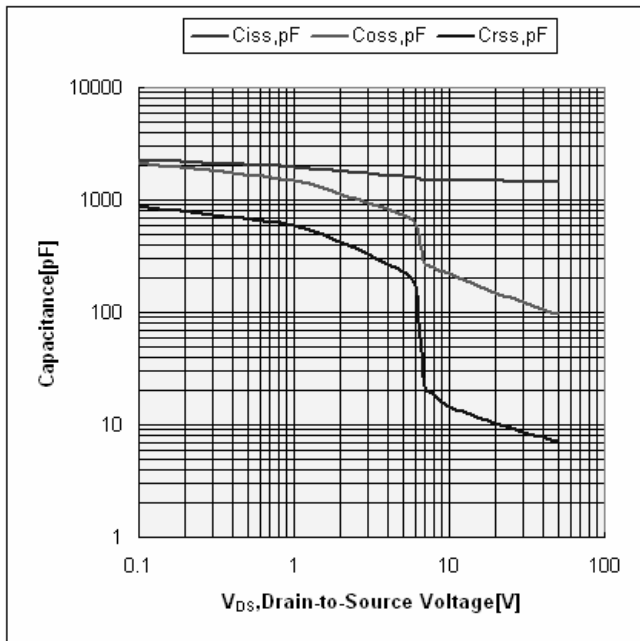


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

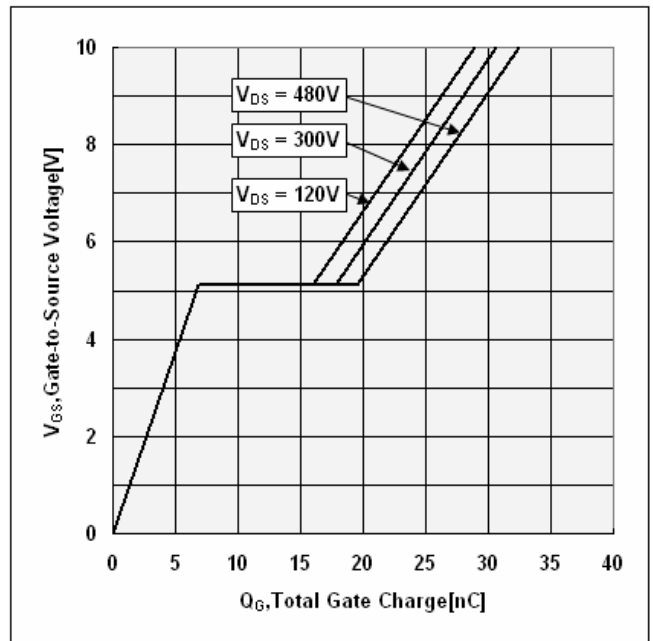
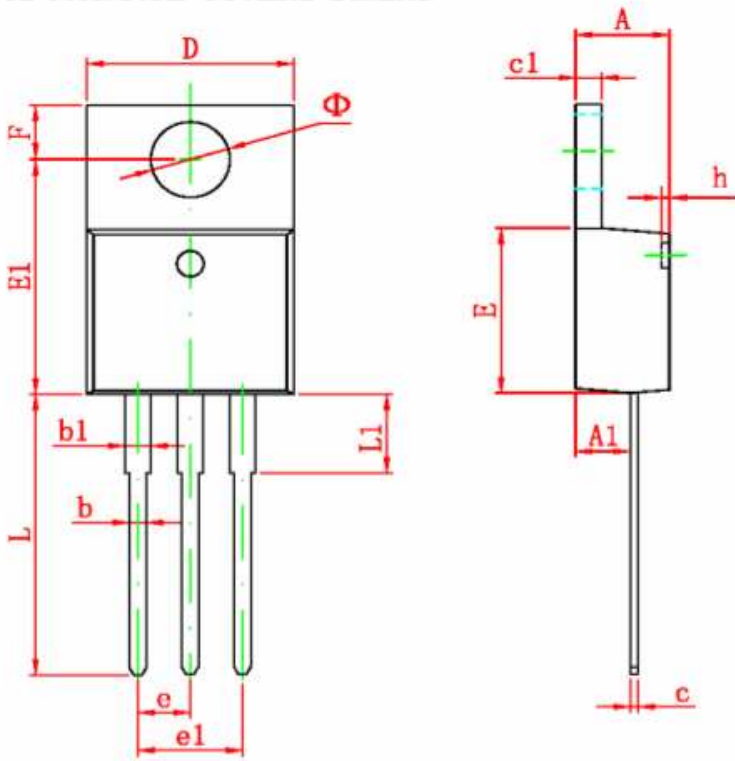


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

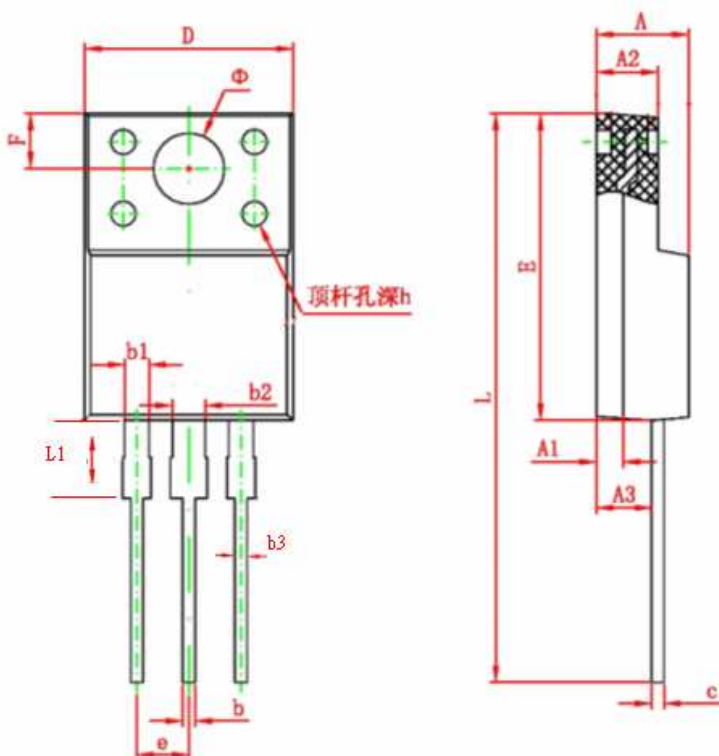
PACKAGE DIMENSION

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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