

GENERAL DESCRIPTION

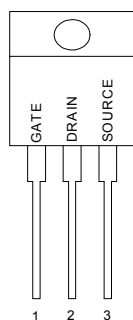
This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers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

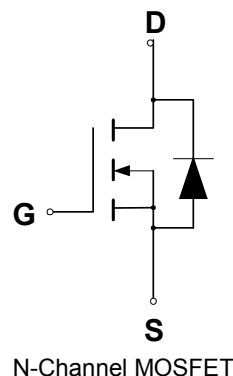
- ◆ Reduced Gate Charge
- ◆ Ultra Low On-Resistance Provides Higher Efficiency
- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆ I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature

PIN CONFIGURATION

TO-220/TO-220FP
Front View



SYMBOL



ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	11.5	A
— Pulsed	I_{DM}	34.5	
Gate-to-Source Voltage — Continue	V_{GS}	± 30	V
Total Power Dissipation — TO220	P_D	210	W
— TO220FP		39	
Derate above 25°C — TO220		1.44	W/°C
— TO220FP		0.39	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy — $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{V}$, $V_{GS} = 10\text{V}$, $I_L = 10.5\text{A}$, $L = 10\text{mH}$, $R_G = 25\Omega$)	E_{AS}	551	mJ
Thermal Resistance — Junction to Case -TO220	θ_{JC}	0.53	°C/W
— Junction to Case -TO220FP		3.3	
— 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
GPT12N60GN220	TO-220
GPT12N60DGN220FP	TO-220 Full Package

*Note: G : Suffix for Pb Free Product

ELECTRICAL CHARACTERISTICS

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

		GPT12N60			
Characteristic	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage (V _{GS} = 0 V, I _D = 250 μA)	V _{(BR)DSS}	600			V
Drain-Source Leakage Current (V _{DS} = 600 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 = 6A) *	R _{DS(on)}			0.65	Ω
Forward Transconductance (V _{DS} = 15 V, I _D = 6A) *	g _{FS}		11		S
Input Capacitance	(V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz)	C _{iss}	1681.8		pF
Output Capacitance		C _{oss}	168.9		pF
Reverse Transfer Capacitance		C _{rss}	11		pF
4Turn-On Delay Time	(V _{DD} = 300 V, I _D = 12 A, V _{GS} = 10 V, R _G = 9.1Ω) *	t _{d(on)}	26.7		ns
Rise Time		t _r	27.1		ns
Turn-Off Delay Time		t _{d(off)}	53.3		ns
Fall Time		t _f	33.1		ns
Total Gate Charge	(V _{DS} = 480 V, I _D = 12 A, V _{GS} = 10 V)*	Q _g	37.8		nC
Gate-Source Charge		Q _{gs}	8.48		nC
Gate-Drain Charge		Q _{gd}	15.2		nC
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage(1)	(I _S = 12A, 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}	466.7		ns

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

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

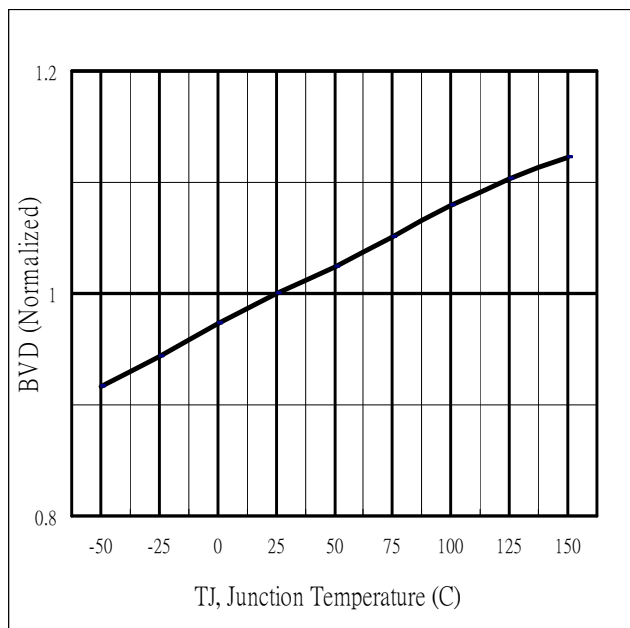


Fig 1. On-Resistance Vs. Temperature

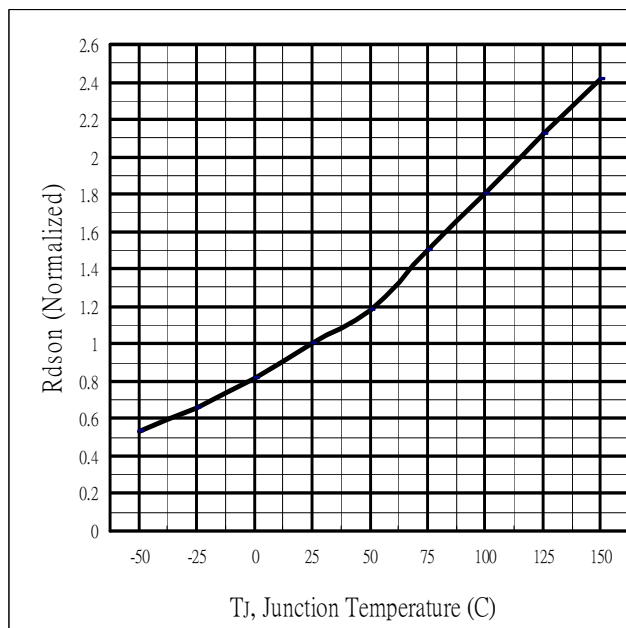


Fig.2 Breakdown Voltage Variation vs. Temperature

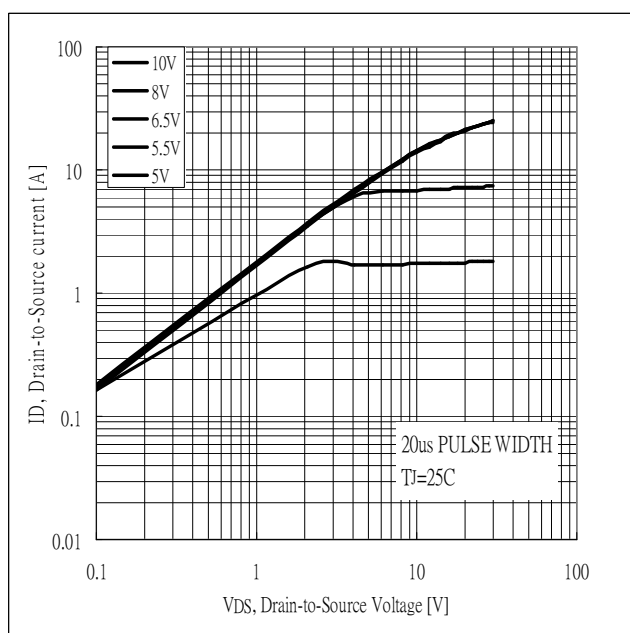


Fig 3. Typical Output Characteristics

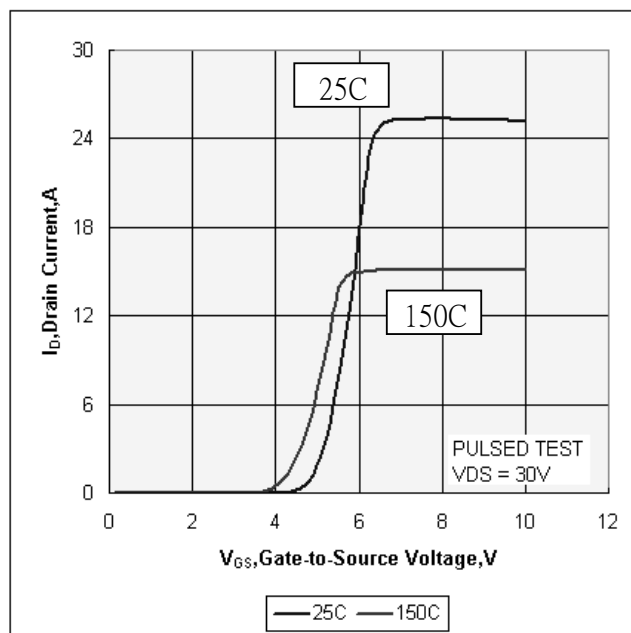


Fig 4. Typical Transfer Characteristics

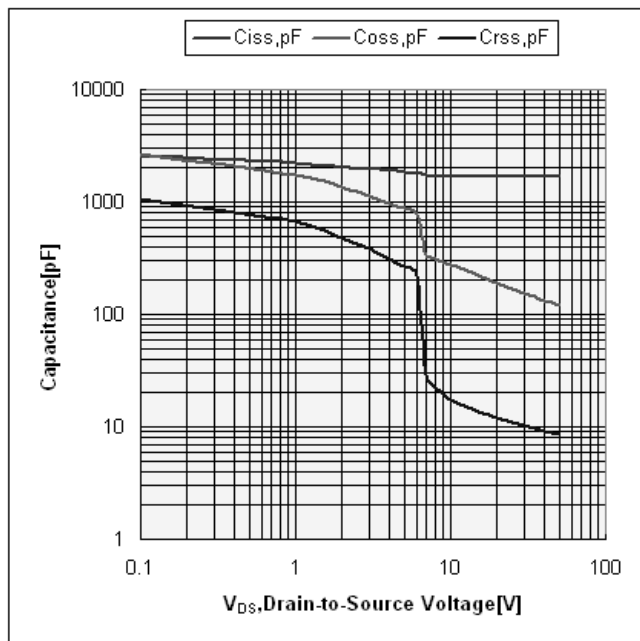


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

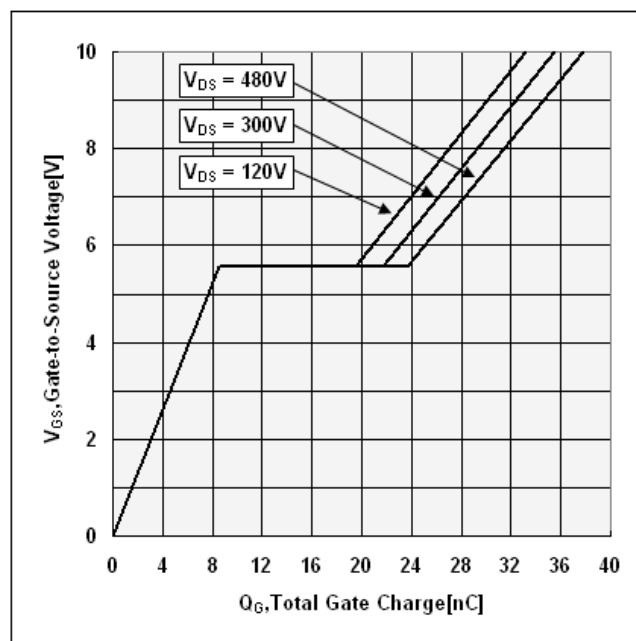
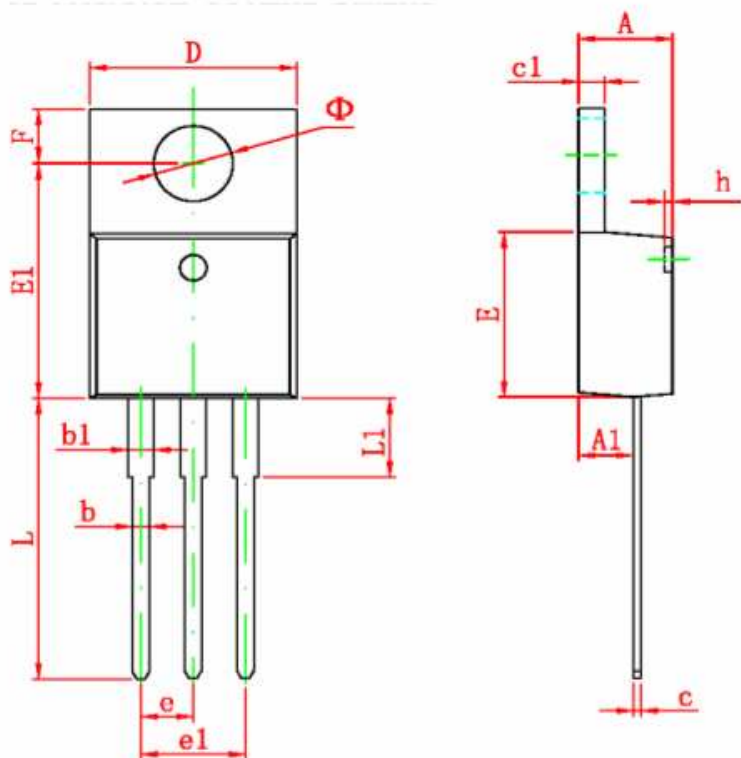


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

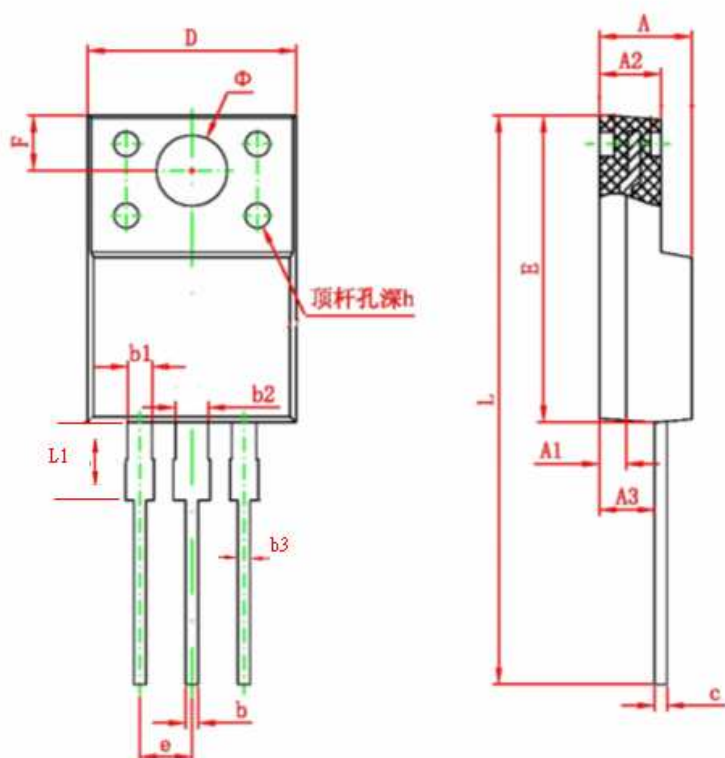
PACKAGE DIMENSION

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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