

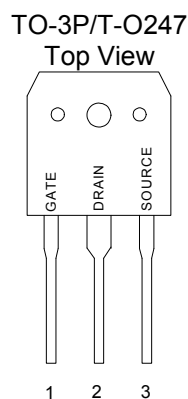
GENERAL DESCRIPTION

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.

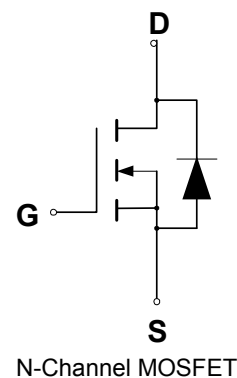
FEATURES

- ◆ 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
- ◆ Isolated Mounting Hole Reduces Mounting Hardware

PIN CONFIGURATION



SYMBOL



ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current – Continuous	I_D	20.5	A
– Pulsed	I_{DM}	61.5	
Gate-to-Source Voltage – Continue	V_{GS}	± 30	V
Total Power Dissipation – TO3P	P_D	260	W
– TO247		240	W/°C
Derate above 25°C – TO3P		2.4	
– TO247		2.3	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{V}, V_{GS} = 10\text{V}, I_L = 18\text{A}, L = 10\text{mH}, R_G = 25\Omega$)	E_{AS}	1620	mJ
Thermal Resistance – Junction to Case -TO3P	θ_{JC}	0.44	°C/W
– Junction to Case -TO247		0.56	
– Junction to Ambient -TO3P, TO247		θ_{JA}	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	°C
ESD SENSITIVITY – HBM, C=100pF, R=1.5kΩ	Vesd	2000	V

(1) Drain current limited by maximum junction temperature

ORDERING INFORMATION

Part Number	Package
GPT21N60GN3P*	TO-3P
GPT21N60GN247*	TO-247

*Note: G : Suffix for PB Free Product

ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	GPT21N60			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		5	V
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ V}, I_D = 10.5\text{A}$) *	$R_{DS(on)}$			0.31	Ω
Forward Transconductance ($V_{DS} = 50\text{ V}, I_D = 10.5\text{A}$) *	g_{FS}		18		S
Input Capacitance	$(V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz})$	C_{iss}	3912		pF
Output Capacitance		C_{oss}	369		pF
Reverse Transfer Capacitance		C_{rss}	12		pF
Turn-On Delay Time	$(V_{DD} = 300\text{ V}, I_D = 21\text{ A}, R_G = 25\Omega) *$	$t_{d(on)}$	45.9		ns
Rise Time		t_r	89.1		ns
Turn-Off Delay Time		$t_{d(off)}$	93		ns
Fall Time		t_f	62.4		ns
Total Gate Charge	$(V_{DS} = 480\text{ V}, I_D = 21\text{ A}, V_{GS} = 10\text{ V}) *$	Q_g	74.5		nC
Gate-Source Charge		Q_{gs}	22.5		nC
Gate-Drain Charge		Q_{gd}	28.7		nC
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage(1)	$(I_S = 21\text{ A}, d_{IS}/d_t = 100\text{A}/\mu\text{s})$	V_{SD}		1.5	V
Forward Turn-On Time		t_{on}		**	ns
Reverse Recovery Time		t_{rr}		584	ns

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

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

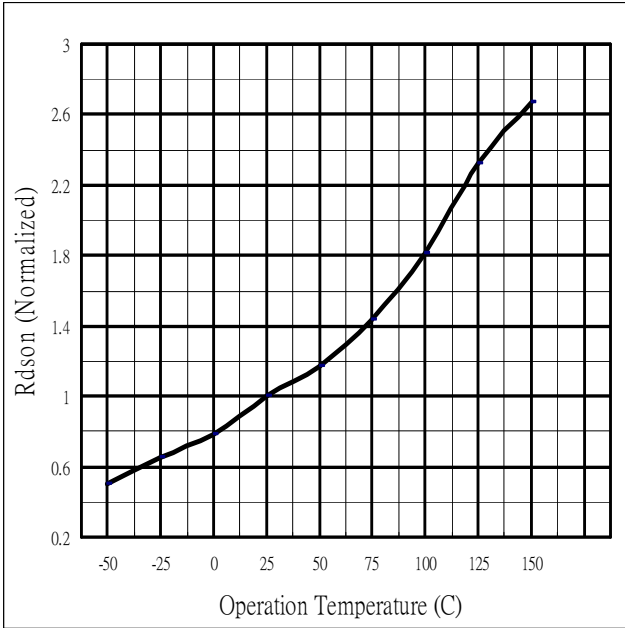


Fig 1. On-Resistance Variation with vs. Temperature

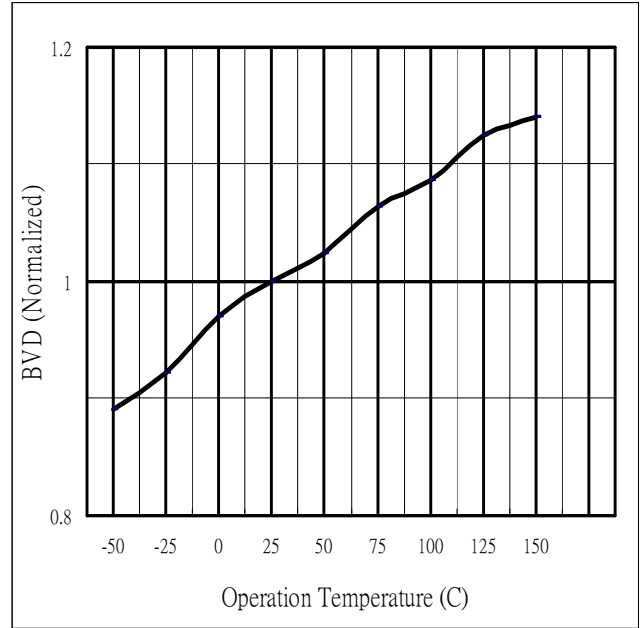


Fig.2 Breakdown Voltage Variation vs. Temperature

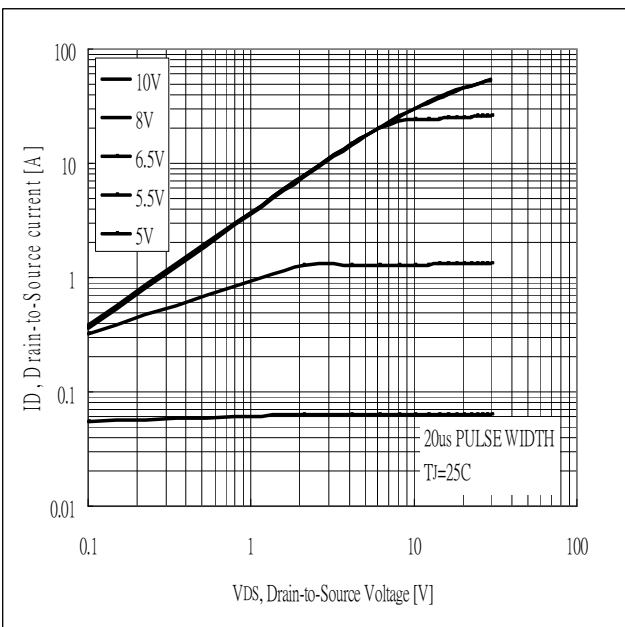


Fig 3. Typical Output Characteristics

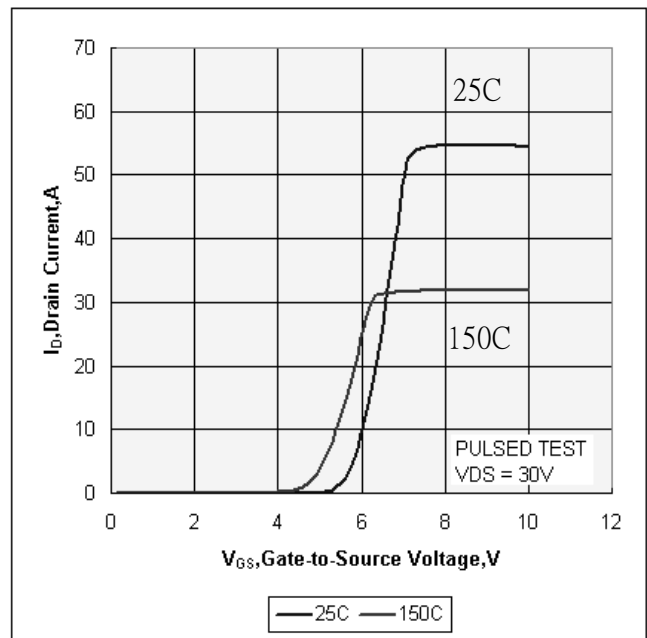


Fig 4. Typical Transfer Characteristics

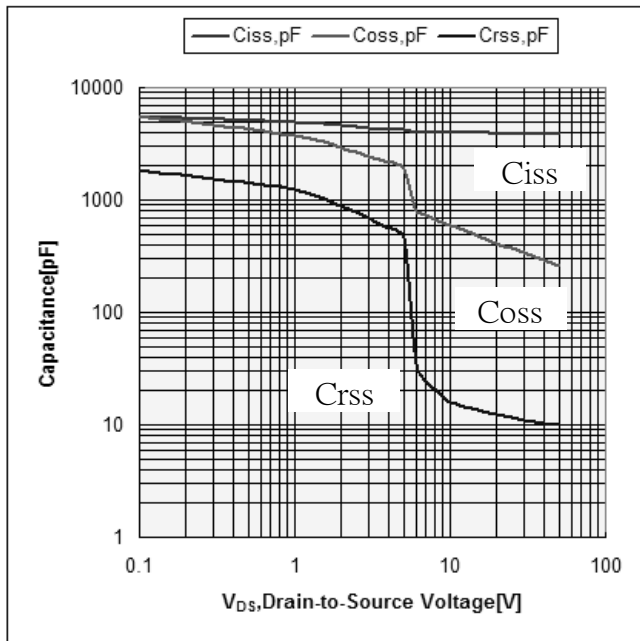


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

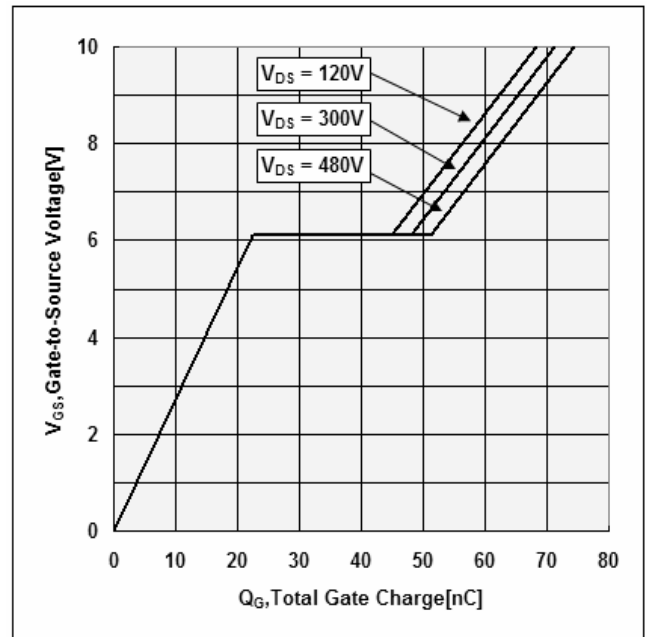
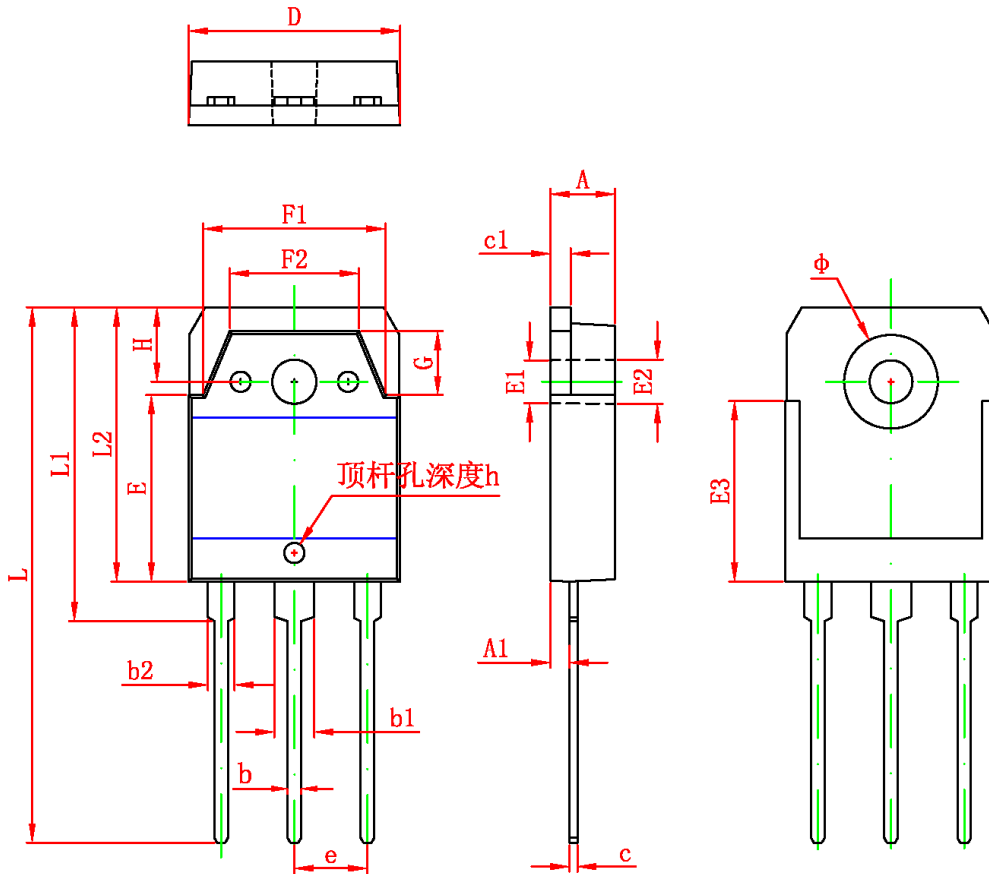


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

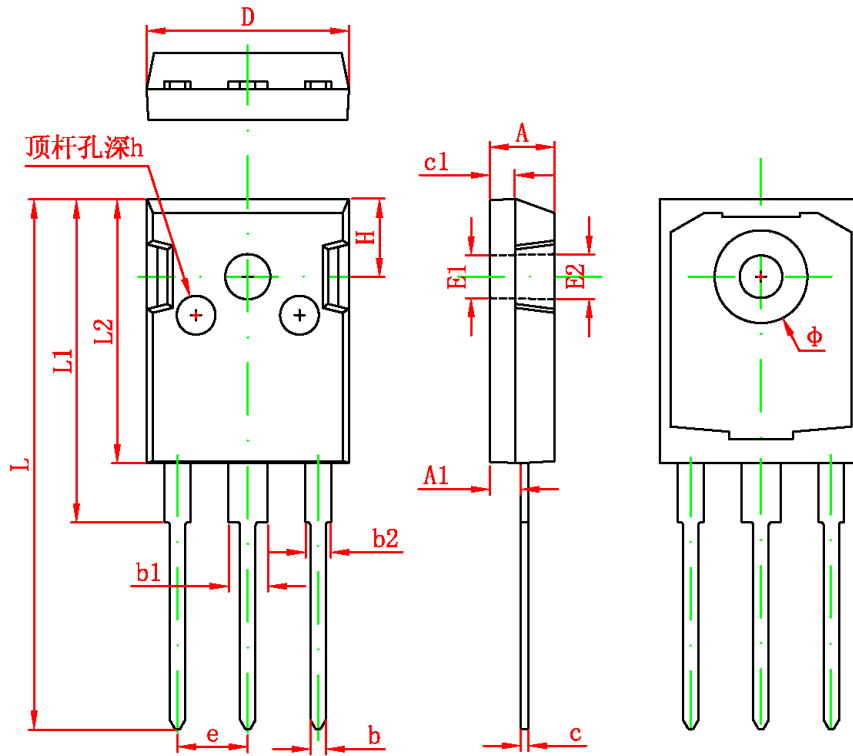
PACKAGE DIMENSION

TO-3P



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.600	5.000	0.181	0.197
A1	1.200	1.600	0.047	0.063
b	0.800	1.200	0.031	0.047
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.450	1.650	0.057	0.065
D	15.450	15.850	0.606	0.622
E	13.700	14.100	0.539	0.555
E1	3.200 REF		0.126 REF	
E2	3.300 REF		0.130 REF	
E3	13.450 REF		0.530 REF	
F1	13.400	13.800	0.528	0.543
F2	9.400	9.800	0.370	0.386
L	39.900	40.300	1.571	1.587
L1	23.200	23.600	0.913	0.929
L2	20.300	20.600	0.799	0.811
φ	6.900	7.100	0.272	0.280
G	5.150	5.550	0.203	0.219
e	5.450 TYP		0.215 TYP	
H	5.000 REF		0.197 REF	
h	0.000	0.300	0.000	0.012

TO-247



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
φ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	
h	0.000	0.300	0.000	0.012

IMPORTANT NOTICE

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