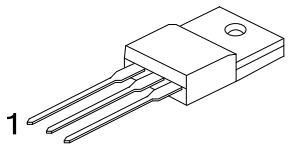
8N50-MT

Power MOSFET

8A, 500V N-CHANNEL POWER MOSFET



TO-220F1

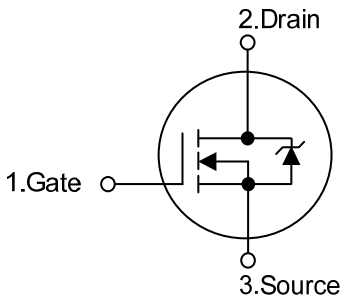
■ DESCRIPTION

The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ FEATURES

* Low $R_{DS(ON)}$< 0.87Ω @ V_{GS}=10V. I_D = 4.4A
* Single Pulse Avalanche Energy Rated
* Fast Switching Speeds
* Linear Transfer Characteristics
* High Input Impedance

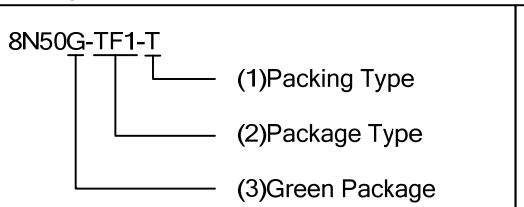
■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
8N50L-TF1-T	8N50G-TF1-T	TO-220F1	G	D	S	Tube

Note: Pin Assignment: G: Gate D: Drain S: Source

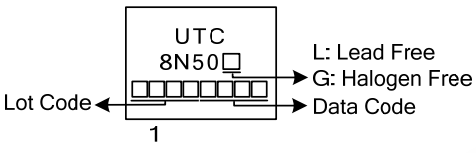


(1) T: Tube

(2) TF1: TO-220F1

(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless Otherwise Specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage (T_J =25°C ~125°C)		V_{DSS}	500	V
Drain to Gate Voltage (R_{GS} = 20kΩ, T_J =25°C ~125°C)		V_{DGR}	500	V
Gate to Source Voltage		V_{GSS}	±30	V
Drain Current (Note 2)	Continuous	I_D	8.0	A
	Pulsed	I_{DM}	32	A
Single Pulse Avalanche Energy (Note 3)		E_{AS}	336	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.3	V/ns
Power Dissipation		P_D	44	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 10mH, I_{AS} = 8.0A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD} ≤ 8.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

■ THERMAL DATA

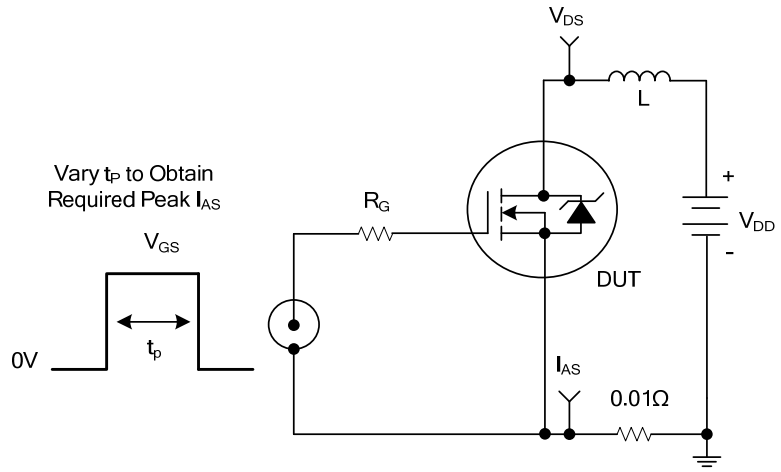
PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$θ_{JA}$	62.5	°C/W
Junction to Case	$θ_{JC}$	2.7	°C/W

■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

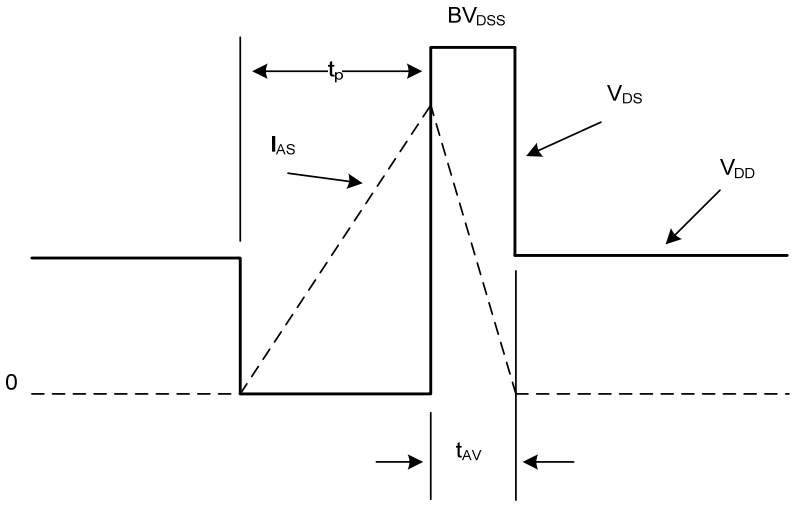
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D = 250μA, V_{GS} = 0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=Rated BV_{DSS}, V_{GS} = 0V			25	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D = 250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V. I_D=4.4A			0.87	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		920		pF
Output Capacitance		C_{OSS}			105		pF
Reverse Transfer Capacitance		C_{RSS}			10		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=400V, V_{GS}=10V, I_D=8A, I_G=10mA (Note 1, 2)		24		nC
Gate to Source Charge		Q_{GS}			3		nC
Gate to Drain Charge		Q_{GD}			2		nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=250V, V_{GS}=10V, I_D=8A, R_G=25Ω (Note 1, 2)		4.8		ns
Rise Time		t_R			11.6		ns
Turn-off Delay Time		$t_{D(OFF)}$			56		ns
Fall-Time		t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				8	A
Maximum Body-Diode Pulsed Current		I_{SM}				32	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=8.0A, V_{GS}=0V			2	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=8.0A, V_{GS}=0V, dI_F/dt=100A/μs		312		nS
Reverse Recovery Charge		Q_{rr}			3.1		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle≤2%.
2. Essentially independent of operating temperature.

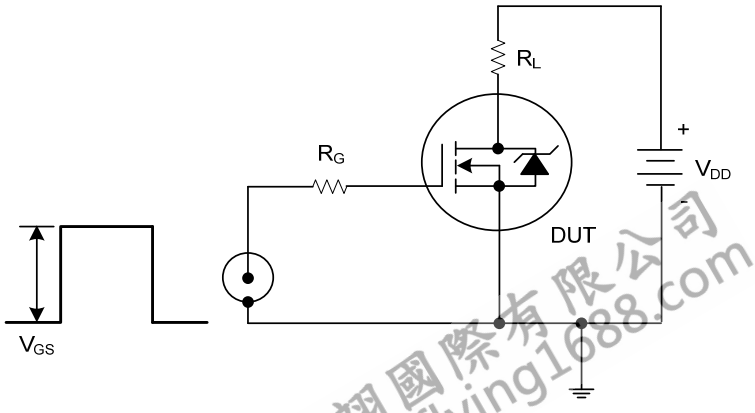
■ TEST CIRCUITS AND WAVEFORMS



Unclamped Energy Test Circuit

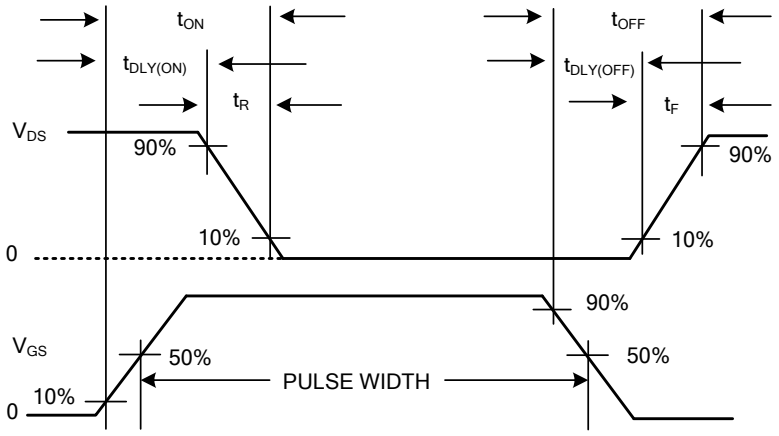


Unclamped Energy Waveforms

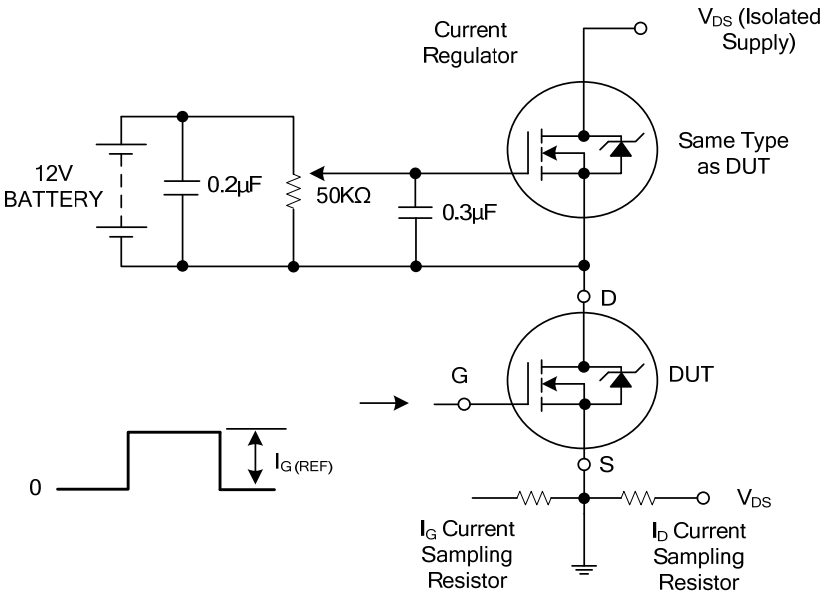


Switching Time Test Circuit

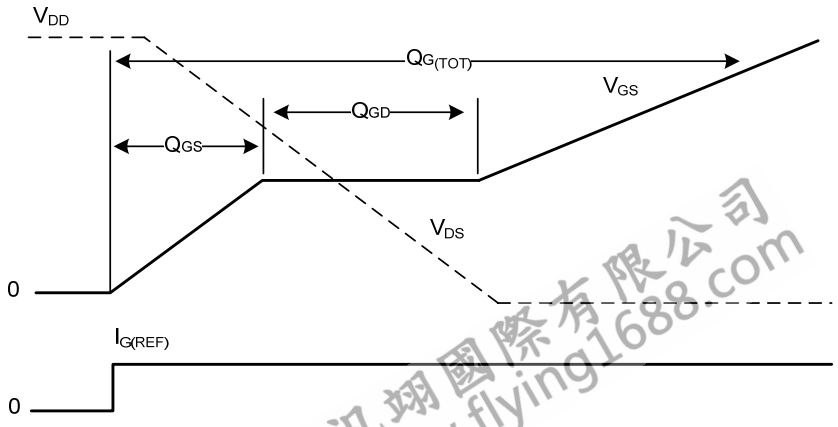
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



Resistive Switching Waveforms



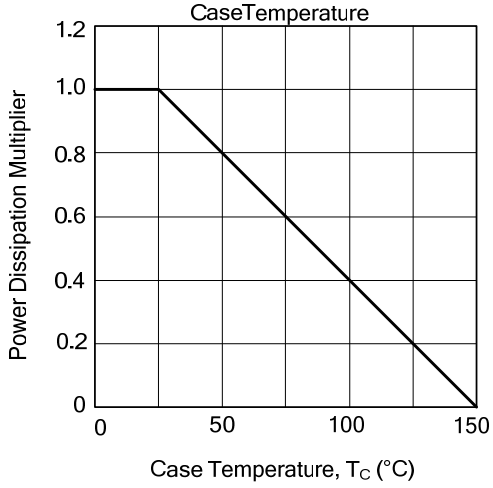
Gate Charge Test Circuit



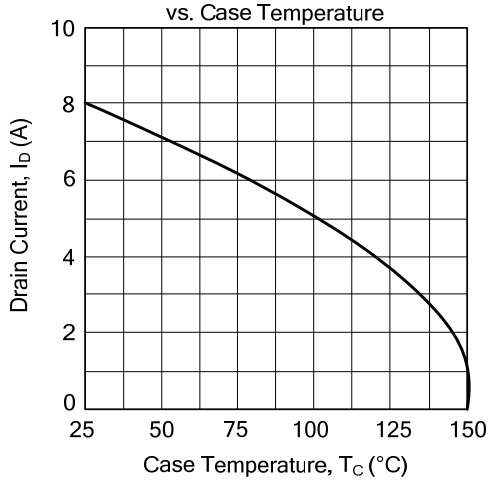
Gate Charge Waveforms

■ TYPICAL CHARACTERISTICS

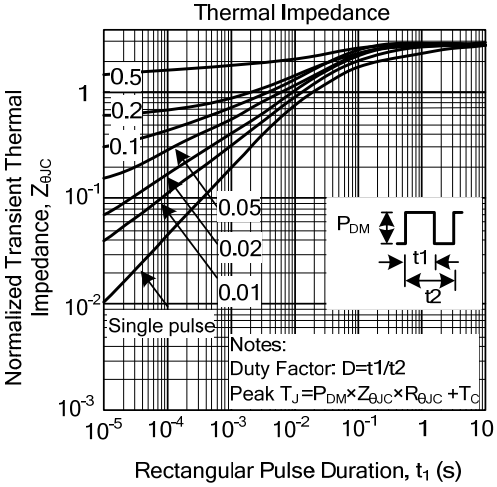
Normalized Power Dissipation vs. CaseTemperature



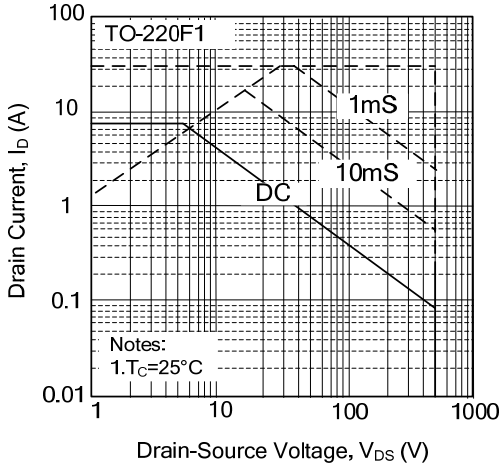
Maximum Contionuous Drain Current vs. Case Temperature



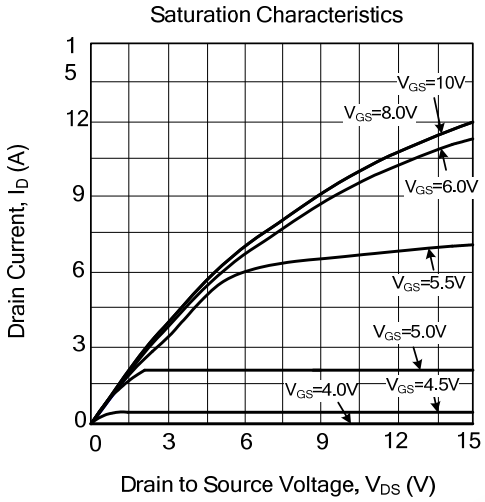
Normalized Maximum Transient Thermal Impedance



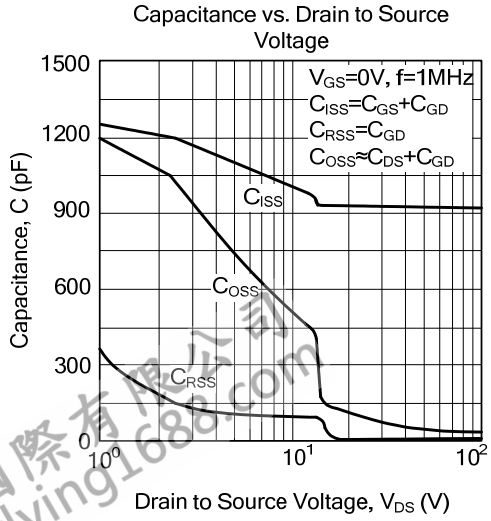
Maximum Safe Operating Area



Saturation Characteristics

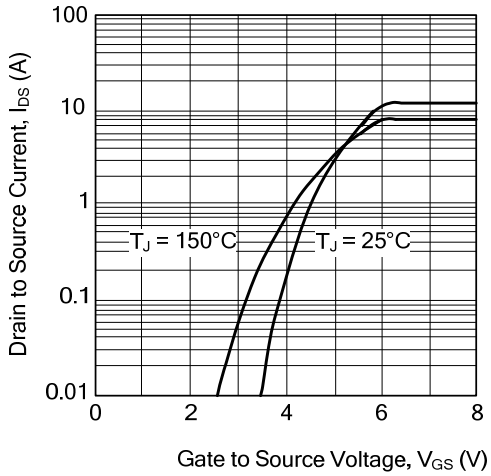


Capacitance vs. Drain to Source Voltage

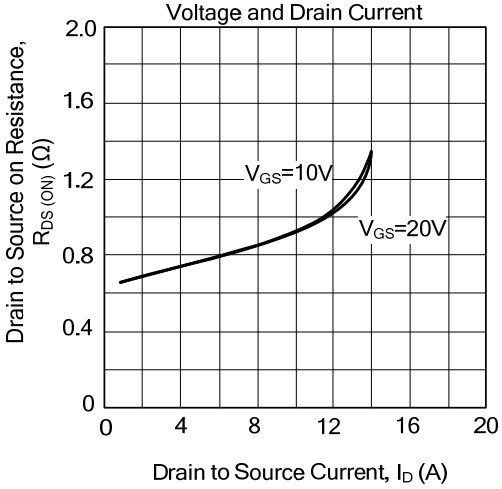


■ TYPICAL CHARACTERISTICS (Cont.)

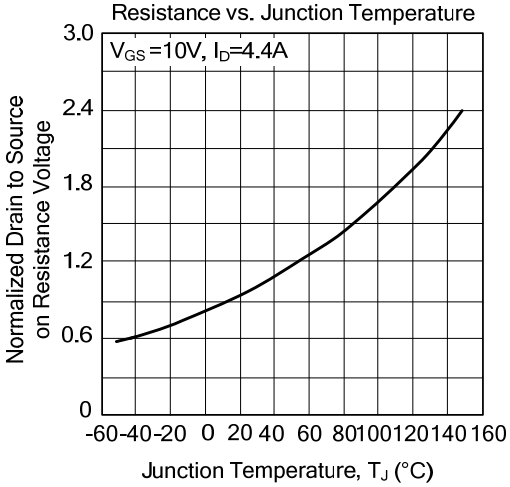
Transfer Characteristics



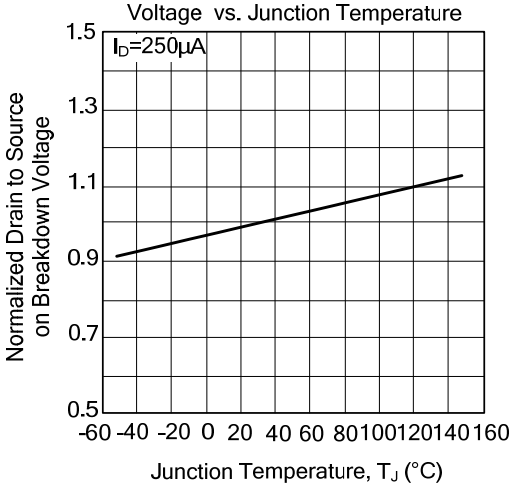
Drain to Source on Resistance vs. Voltage and Drain Current



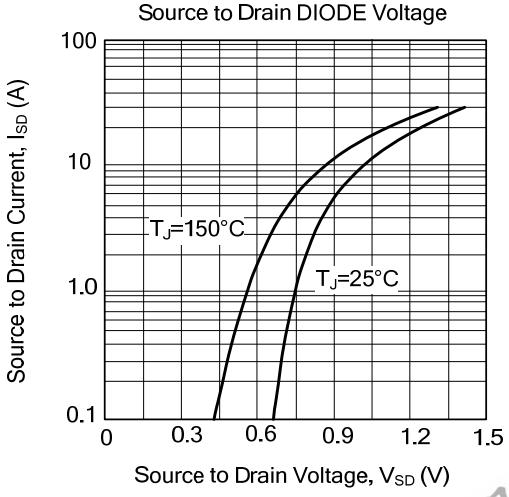
Normalized Drain to Source on Resistance vs. Junction Temperature



Normalized Drain to Source Breakdown Voltage vs. Junction Temperature



Source to Drain DIODE Voltage



Gate to Source Voltage vs. Gate Charge