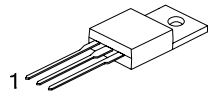
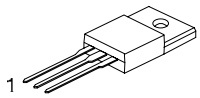
50N06

Power MOSFET

50 Amps, 60 Volts
N-CHANNEL POWER MOSFET



TO-220



TO-220F

*Pb-free plating product number: 50N06L

■ DESCRIPTION

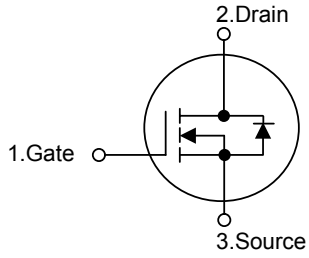
The UTC **50N06** is three-terminal silicon device with current conduction capability of about 50A, fast switching speed. Low on-state resistance, breakdown voltage rating of 60V, and max threshold voltages of 4 volt.

It is mainly suitable electronic ballast, and low power switching mode power appliances.

■ FEATURES

* $R_{DS(ON)}$ = 23mΩ@V_{GS} = 10 V
* Ultra low gate charge (typical 30 nC)
* Low reverse transfer capacitance (C_{RSS} = typical 80 pF)
* Fast switching capability
* 100% avalanche energy specified
* Improved dv/dt capability

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
50N06-TA3-T	50N06L-TA3-T	TO-220	G	D	S	Tube
50N06-TF3-T	50N06L-TF3-T	TO-220F	G	D	S	Tube

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

50N06L-TA3-T (1)Packing Type (2)Package Type (3)Lead Plating	(1) T: Tube (2) TA3: TO-220, TF3: TO-220F (3) L: Lead Free Plating, Blank: Pb/Sn

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C = 25℃	I_D	50	A
	T_C = 100℃		35	A
Pulsed Drain Current (Note 1)		I_{DM}	200	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	480	mJ
	Repetitive (Note 1)	E_{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	7	V/ns
Power Dissipation	TO-220	P_D	120	W
	TO-220F		70	W
Junction Temperature		T_J	+150	℃
Operation and Storage Temperature		T_{STG}	-55 ~ +150	℃

Note: 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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction-to-Ambient	TO-220	θ_{JA}	62	°C/W
	TO-220F		62	°C/W
Junction-to-Case	TO-220	θ_{JC}	1.24	°C/W
	TO-220F		1.78	°C/W

■ ELECTRICAL CHARACTERISTICS (T_C = 25℃ unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0 V, I_D = 250 μA	60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS} = 20V, V_{DS} = 0 V			100	nA
	Reverse		V_{GS} = -20V, V_{DS} = 0 V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D = 250 μA, Referenced to 25℃		0.07		V/℃
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 25 A		18	23	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1MHz		900	1220	pF
Output Capacitance		C_{OSS}			430	550	pF
Reverse Transfer Capacitance		C_{RSS}			80	100	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD} = 30V, I_D =25 A, R_G = 50Ω (Note 4, 5)		40	60	ns
Turn-On Rise Time		t_R			100	200	ns
Turn-Off Delay Time		$t_{D(OFF)}$			90	180	ns
Turn-Off Fall Time		t_F			80	160	ns
Total Gate Charge		Q_G	V_{DS} = 48V, V_{GS} = 10 V, I_D = 50A (Note 4, 5)		30	40	nC
Gate-Source Charge		Q_{GS}			9.6		nC
Gate-Drain Charge		Q_{GD}			10		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	I_S = 50A, V_{GS} = 0 V			1.5	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				50	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				200	A
Reverse Recovery Time	t_{RR}	I_S = 50A, V_{GS} = 0 V		54		ns
Reverse Recovery Charge	Q_{RR}	dI_F / dt = 100 A/μs		81		μC

Notes: 1. Repetitive Rating: Pulse width limited by T_J
2. L=0.38mH, I_{AS}=50A, V_{DD}=25V, R_G=20Ω, Starting T_J=25°C
3. I_{SD}≤50A, di/dt≤300A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25°C
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%
5. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

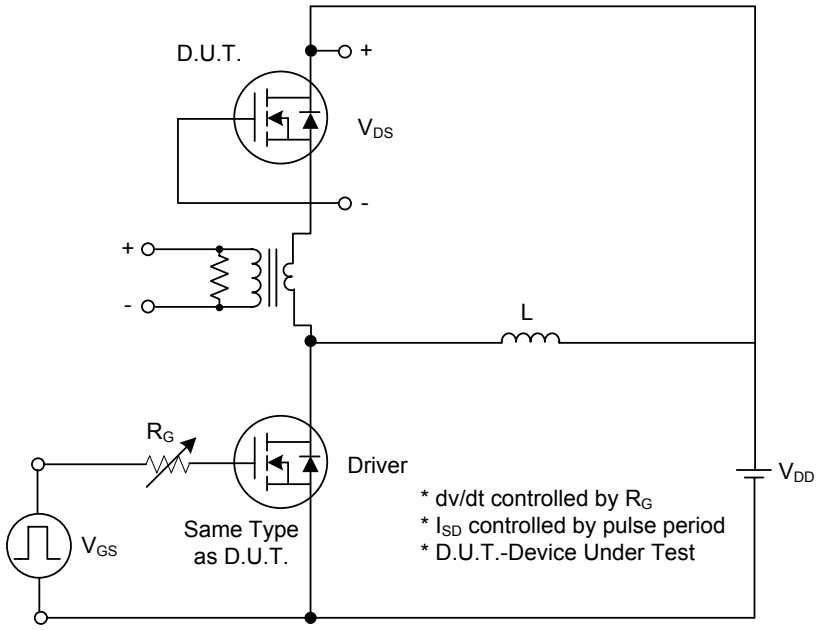


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

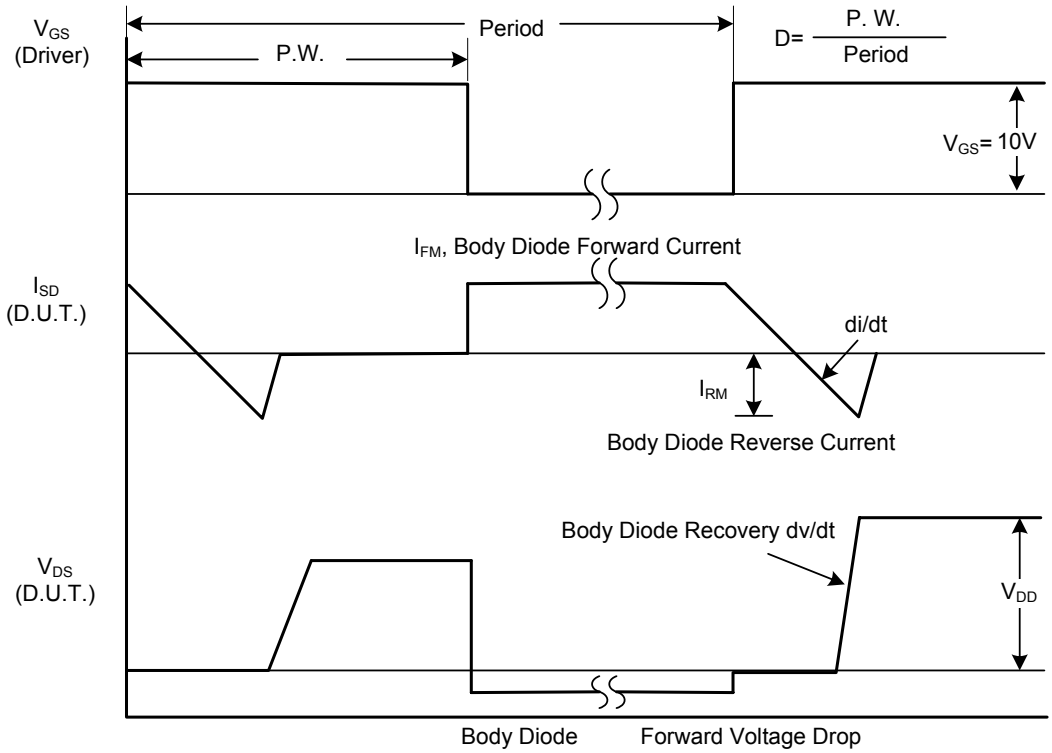


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

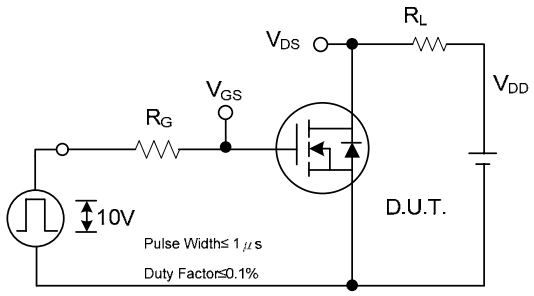


Fig. 2A Switching Test Circuit

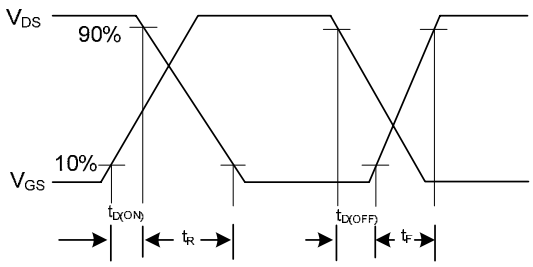


Fig. 2B Switching Waveforms

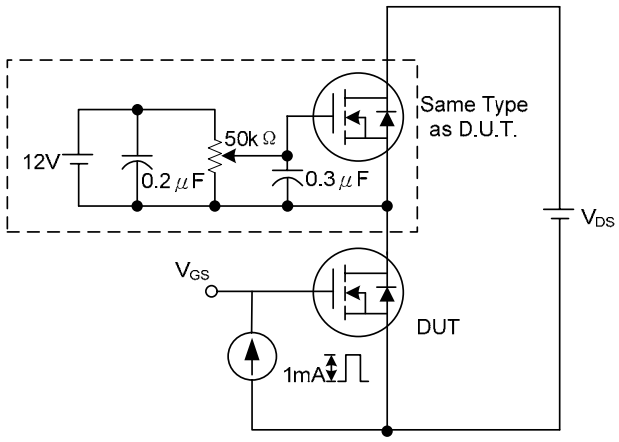


Fig. 3A Gate Charge Test Circuit

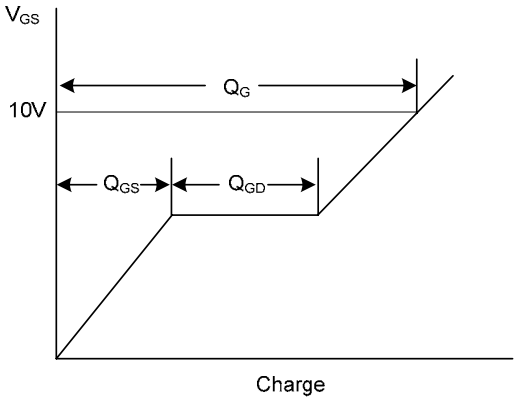


Fig. 3B Gate Charge Waveform

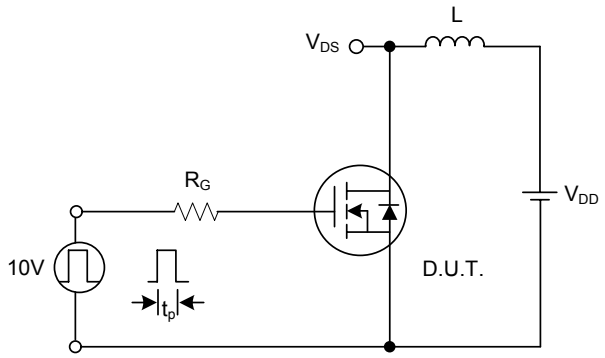


Fig. 4A Unclamped Inductive Switching Test Circuit

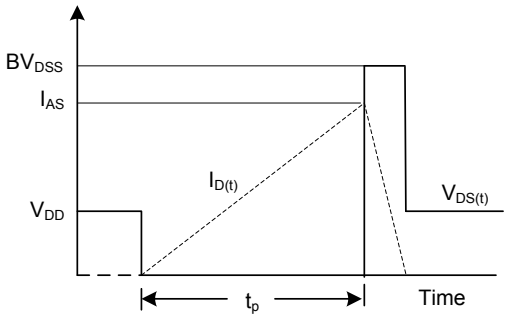
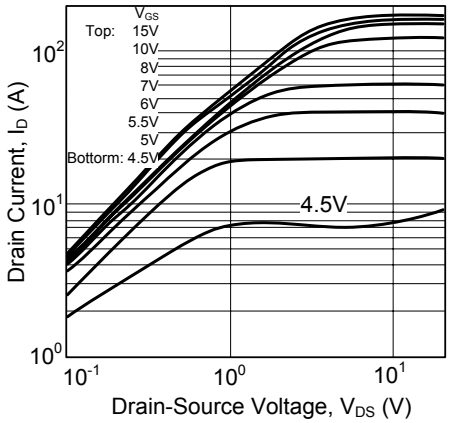


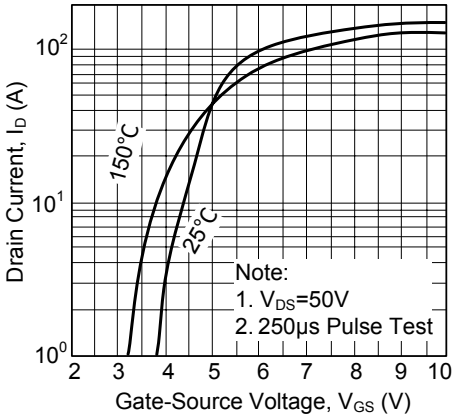
Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

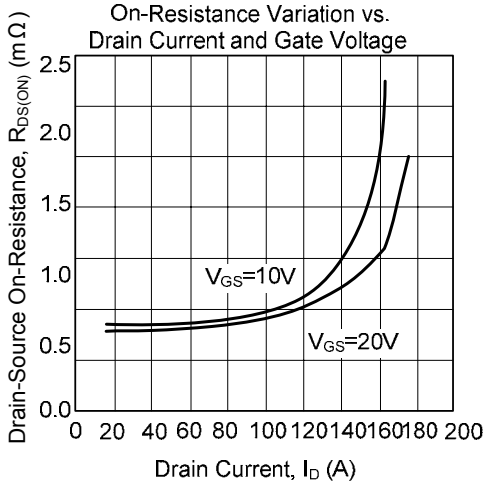
On-State Characteristics



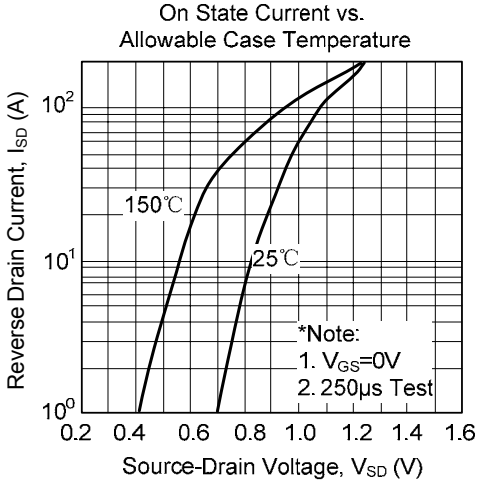
Transfer Characteristics



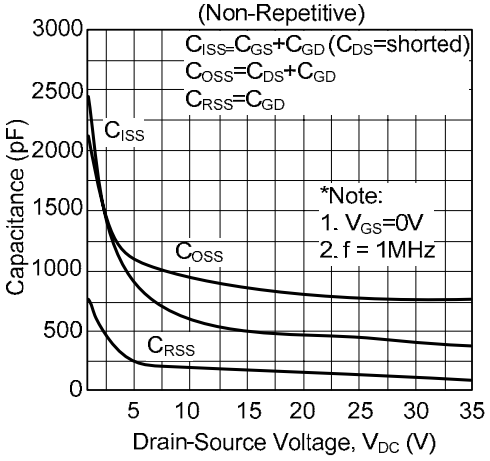
On-Resistance Variation vs. Drain Current and Gate Voltage



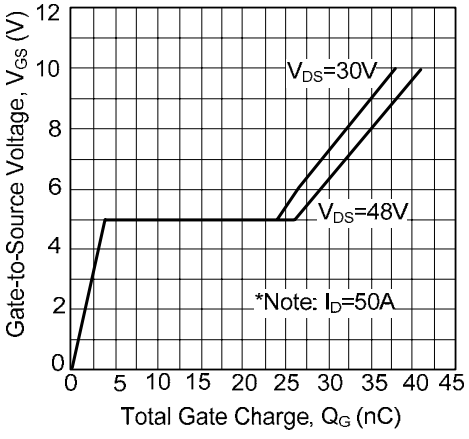
On State Current vs. Allowable Case Temperature



Capacitance Characteristics (Non-Repetitive)

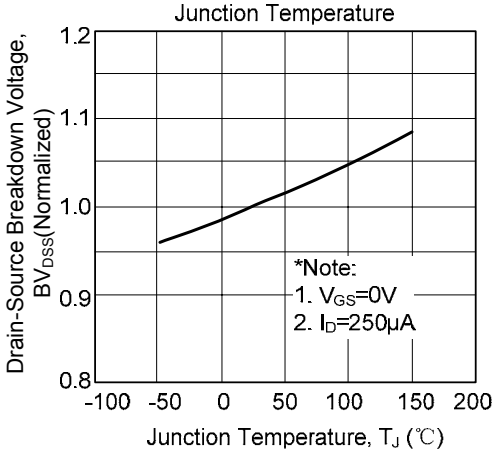


Gate Charge Characteristics

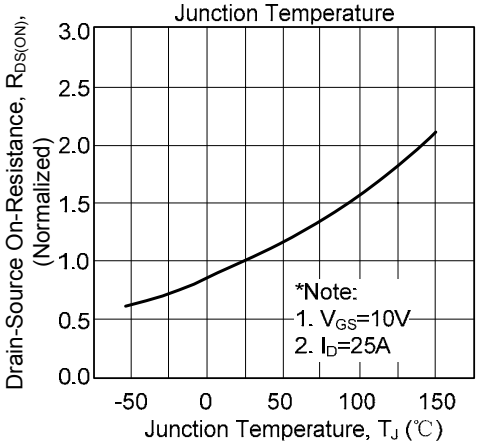


■ TYPICAL CHARACTERISTICS(Cont.)

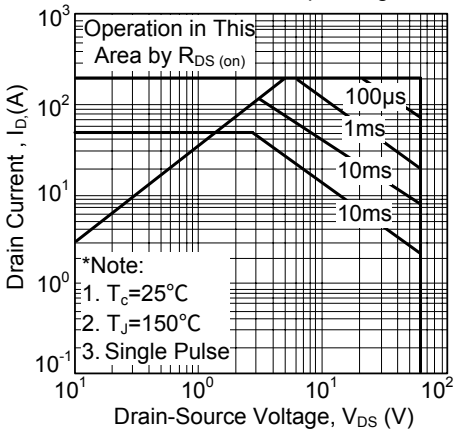
Breakdown Voltage Variation vs. Junction Temperature



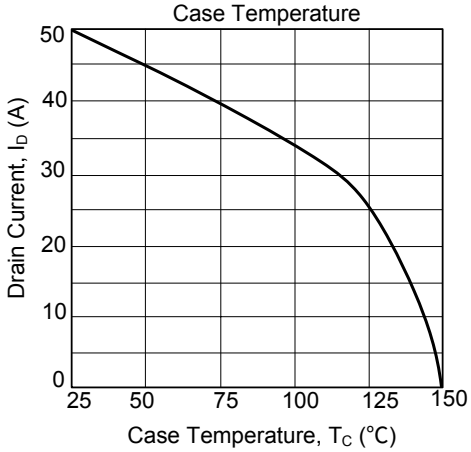
On-Resistance Variation vs. Junction Temperature



Maximum Safe Operating



Maximum Drain Current vs. Case Temperature



Transient Thermal Response Curve