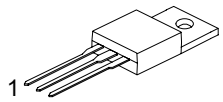
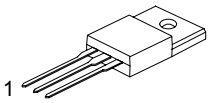
70N06

MOSFET

70 Amps, 60 Volts
N-CHANNEL POWER MOSFET



TO-220



TO-220F

*Pb-free plating product number: 70N06L

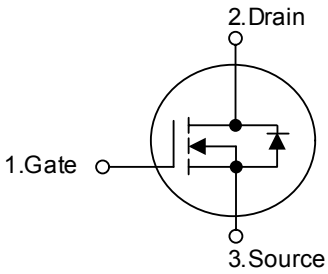
■ DESCRIPTION

The UTC **70N06** is n-channel enhancement mode power field effect transistors with stable off-state characteristics, fast switching speed, low thermal resistance, usually used at telecom and computer application.

■ FEATURES

* $R_{DS(ON)}$ = 15mΩ@V_{GS} = 10 V
* Ultra low gate charge (typical 90 nC)
* Low reverse transfer Capacitance (C_{RSS} = typical 80 pF)
* Fast switching capability
* 100% avalanche energy specified
* Improved dv/dt capability

■ SYMBOL



■ ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
70N06-TA3-T	70N06L-TA3-T	TO-220	G	D	S	Tube
70N06-TF3-T	70N06L-TF3-T	TO-220F	G	D	S	Tube

70N06L-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 to Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C = 25℃	I_D	70	A
	T_C = 100℃		56	A
Drain Current Pulsed (Note 1)		I_{DM}	280	A
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	600	mJ
Repetitive Avalanche Energy (Note 1)		E_{AR}	20	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	10	V/ns
Total Power Dissipation (T_C = 25℃)		P_D	200	W
Derating Factor above 25℃			1.4	W/℃
Operation Junction Temperature		T_J	-55 ~ +150	℃
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.

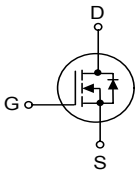
■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Thermal Resistance, Junction-to-Case	θ_{JC}			1.2	°C/W
Thermal Resistance, Case-to-Sink	θ_{CS}		0.5		°C/W
Thermal Resistance, Junction-to-Ambient	θ_{JA}			62.5	°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
Breakdown Voltage Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	I_D = 1mA, Referenced to 25℃		0.08		V/℃
Drain-Source Leakage Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V			1	μA
		V_{DS} = 60 V, V_{GS} = 0 V, T_J = 150℃			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 20V, V_{DS} = 0 V			100	nA
Gate-Source Leakage Reverse		V_{GS} = -20V, V_{DS} = 0 V			-100	nA
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 = 35 A		12	15	mΩ
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, V_{DS} = 25 V f = 1MHz		3300		pF
Output Capacitance	C_{OSS}			530		pF
Reverse Transfer Capacitance	C_{RSS}			80		pF
Switching Characteristics						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = 30V, I_D =70 A, V_{GS}=10V, (Note 4, 5)		12		ns
Rise Time	t_R			79		ns
Turn-Off Delay Time	$t_{D(OFF)}$			80		ns
Fall Time	t_F			52		ns
Total Gate Charge	Q_G	V_{DS} = 60V, V_{GS} = 10 V I_D = 48A, (Note 4, 5)		90	140	nC
Gate-Source Charge	Q_{GS}			20	35	nC
Gate-Drain Charge (Miller Charge)	Q_{GD}			30	45	nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Source-Drain Diode Ratings and Characteristics						
Diode Forward Voltage	V_{SD}	I_S = 70A, V_{GS} = 0 V			1.4	V
Continuous Source Current	I_S	Integral Reverse p-n Junction Diode in the MOSFET 			70	A
Pulsed Source Current	I_{SM}				280	
Reverse Recovery Time	t_{RR}	I_S = 70A, V_{GS} = 0 V		90		ns
Reverse Recovery Charge	Q_{RR}	dI_F / dt = 100 A/μs		300		μC

Note 1. Repeativity rating: pulse width limited by junction temperature
2. L=19.5mH, I_{AS}=70A, R_G=20Ω, Starting T_J=25℃
3. I_{SD}≤48A, di/dt≤300A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25℃
4. Pulse Test: Pulse Width≤300μs,Duty Cycle≤2%
5. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

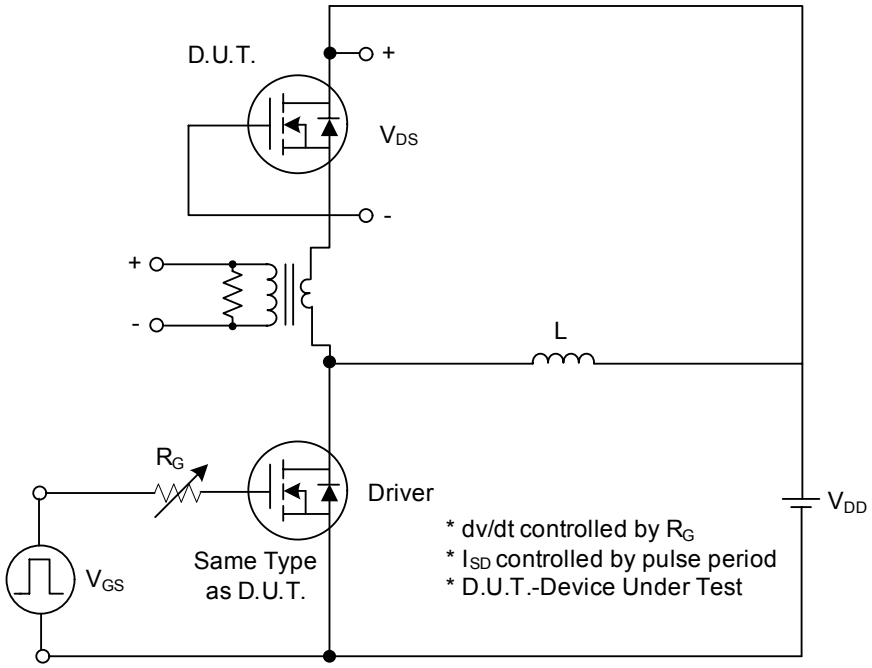


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

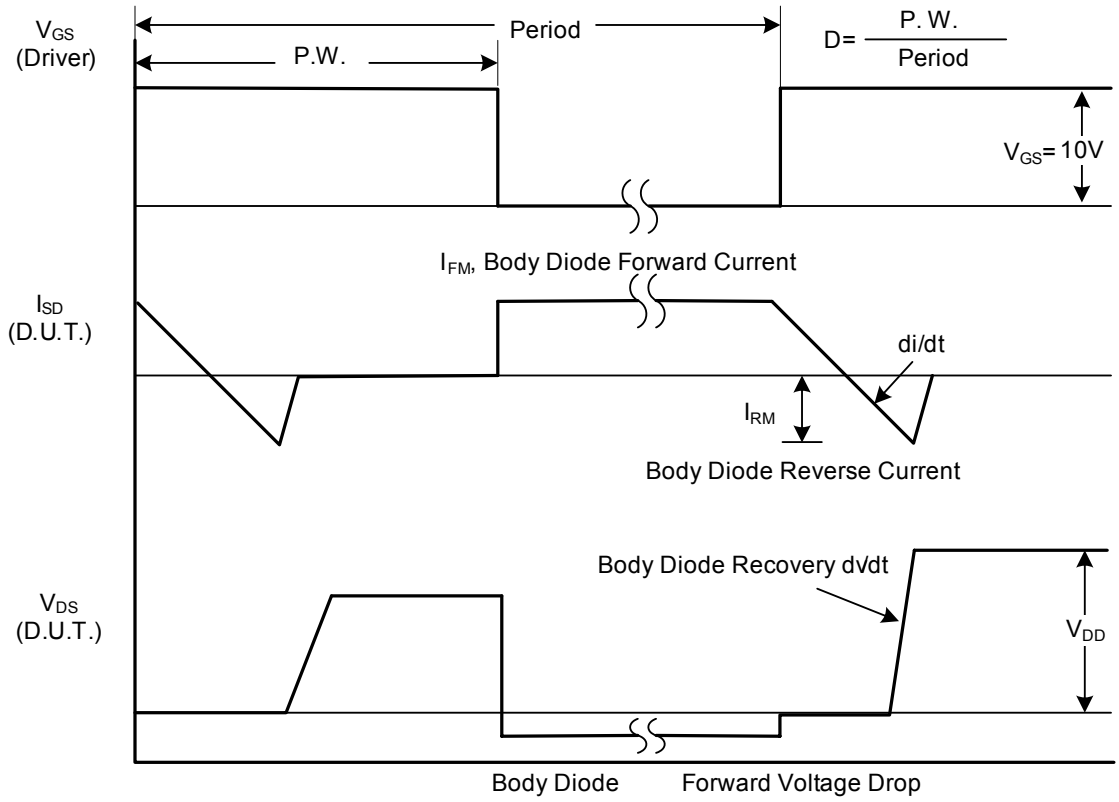


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

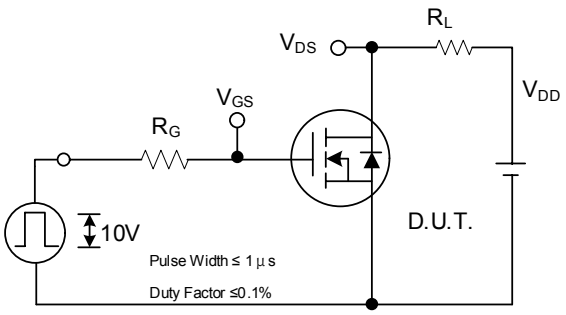


Fig. 2A Switching Test Circuit

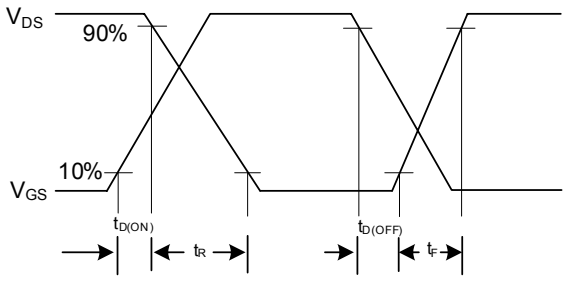


Fig. 2B Switching Waveforms

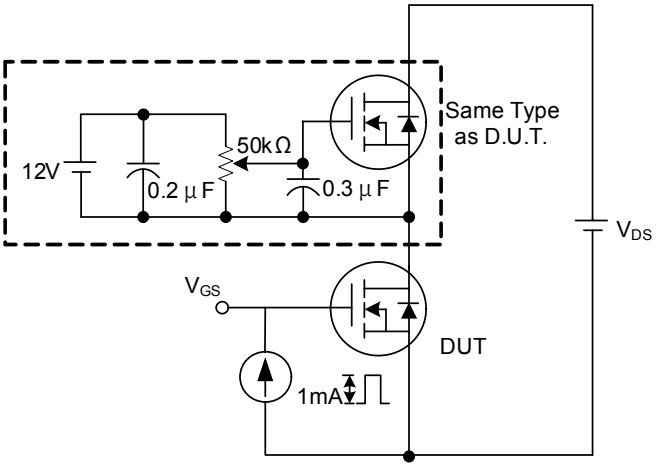


Fig. 3A Gate Charge Test Circuit

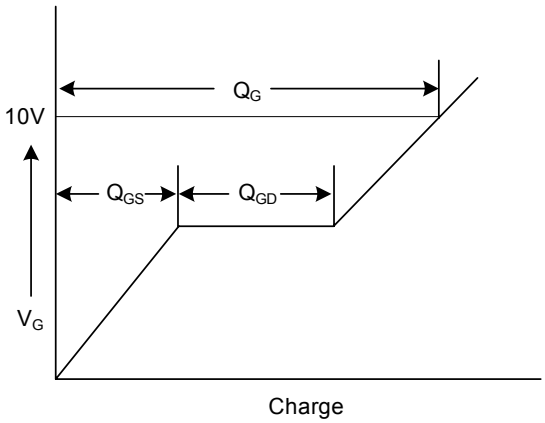


Fig. 3B Gate Charge Waveform

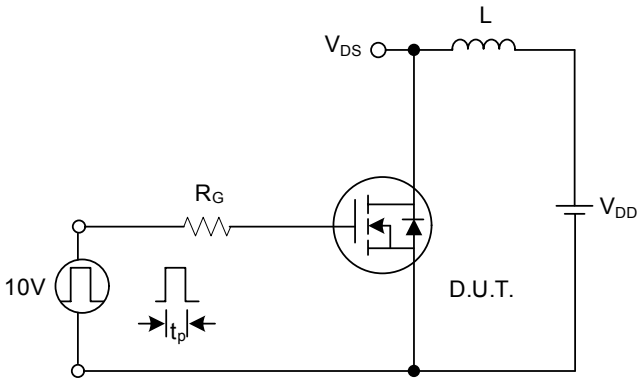


Fig. 4A Unclamped Inductive Switching Test Circuit

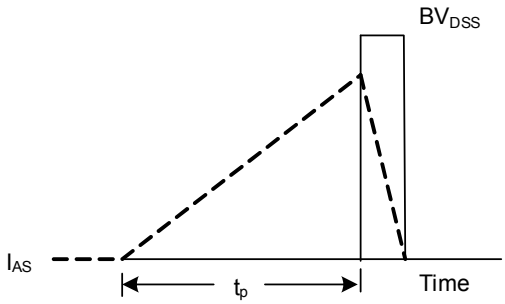
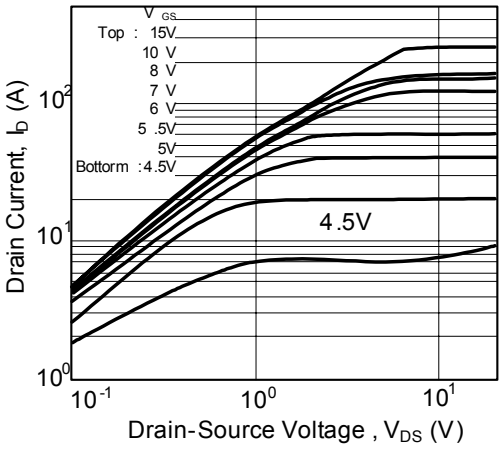


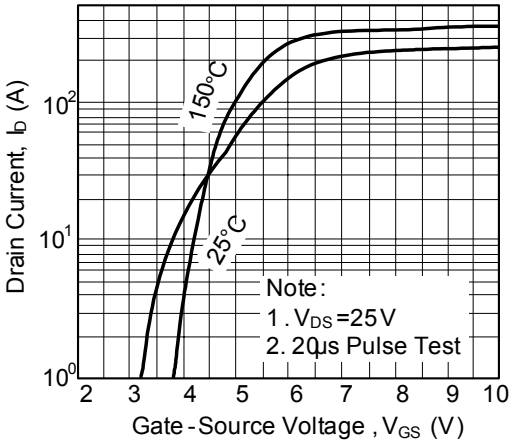
Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

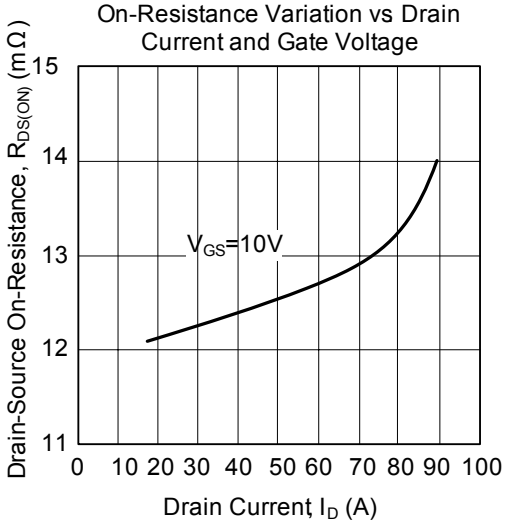
On-State Characteristics



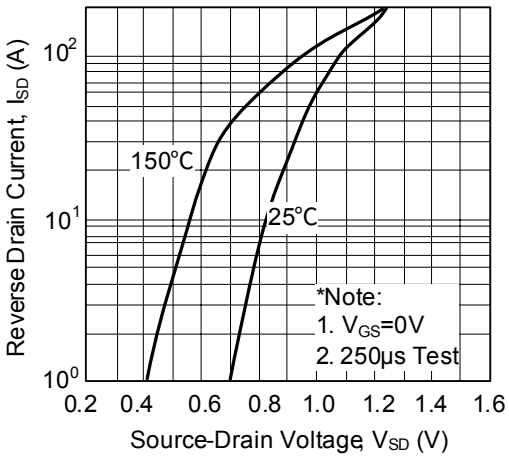
Transfer Characteristics



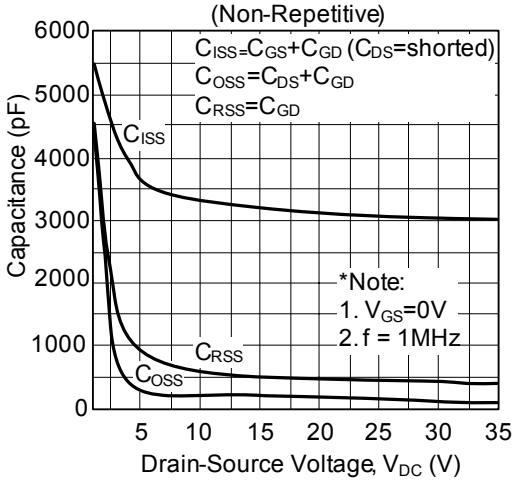
On-Resistance Variation vs Drain Current and Gate Voltage



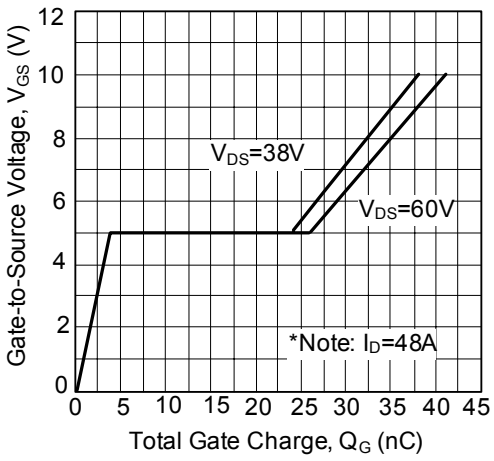
Reverse Drain Current vs Allowable Case Temperature



Capacitance Characteristics (Non-Repetitive)

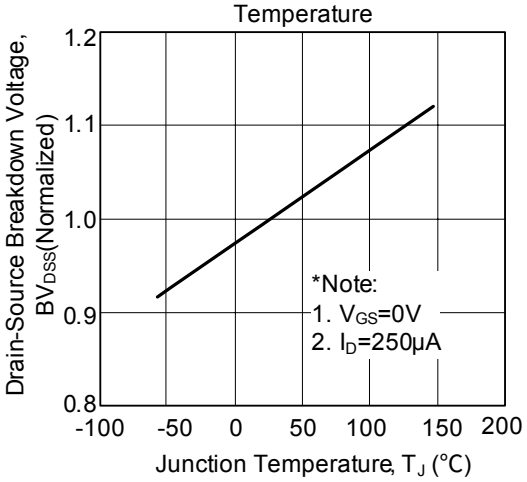


Gate Charge Characteristics

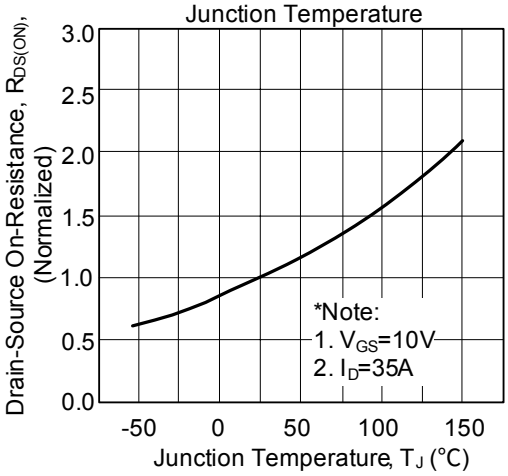


■ TYPICAL CHARACTERISTICS

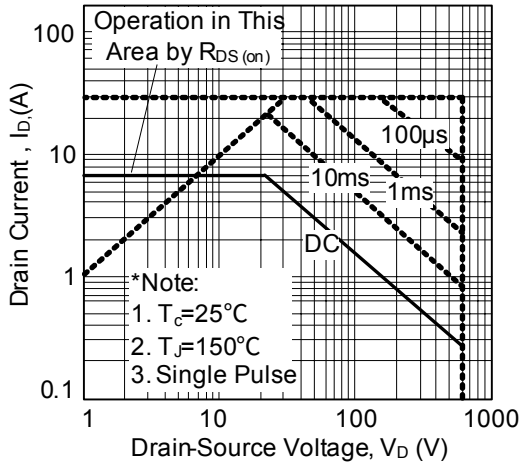
Breakdown Voltage Variation vs Junction Temperature



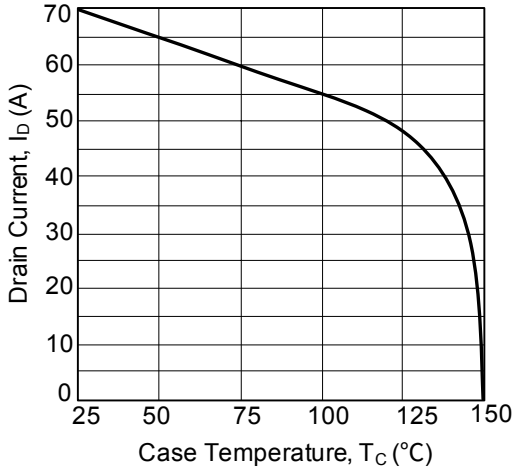
On-Resistance Variation vs Junction Temperature



Maximum Safe Operating



Maximum Drain Current vs. Case Temperature



Transient Thermal Response Curve