



70N06

MOSFET

70 Amps, 60 Volts N-CHANNEL POWER MOSFET

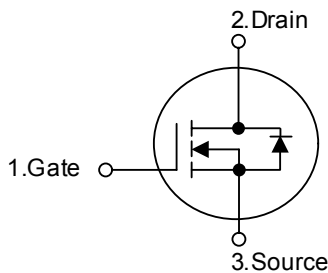
DESCRIPTION

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

- * $R_{DS(ON)} = 15m\Omega @ V_{GS} = 10V$
- * 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

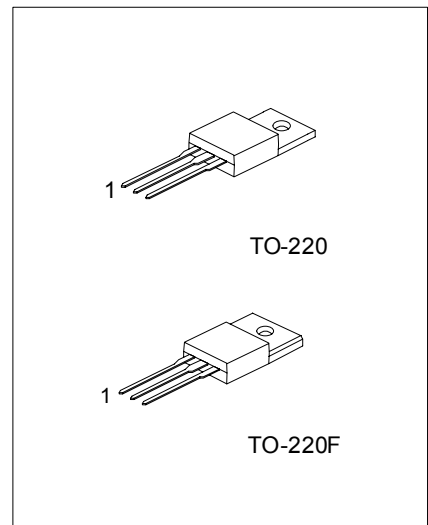
SYMBOL



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

<p>70N06L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Plating</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF3: TO-220F</p> <p>(3) L: Lead Free Plating Blank: Pb/Sn</p>
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*Pb-free plating product number: 70N06L

■ 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	I_D	$T_C = 25$	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.

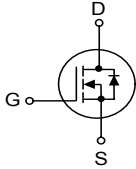
■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Thermal Resistance, Junction-to-Case	θ_{JC}			1.2	$^{\circ}\text{C/W}$
Thermal Resistance, Case-to-Sink	θ_{CS}		0.5		$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	θ_{JA}			62.5	$^{\circ}\text{C/W}$

■ ELECTRICAL CHARACTERISTICS ($T_C = 25$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
Breakdown Voltage Temperature Coefficient	BV_{DSS}/T_J	$I_D = 1\text{ mA}$, Referenced to 25		0.08		V/
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 150$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
Gate-Source Leakage Reverse		$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 35\text{ A}$		12	15	m Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$		3300		pF
Output Capacitance	C_{OSS}			530		pF
Reverse Transfer Capacitance	C_{RSS}			80		pF
Switching Characteristics						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 30\text{ V}, I_D = 70\text{ A},$ $V_{GS} = 10\text{ V}$, (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		$V_{DS} = 60\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 48\text{ A}$, (Note 4, 5)		90	140
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}	$I_S = 70A, V_{GS} = 0V$			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}	$I_S = 70A, V_{GS} = 0V$		90		ns
Reverse Recovery Charge	Q_{RR}	$di_F / dt = 100 A/\mu s$		300		μC

Note 1. Repeativity rating: pulse width limited by junction temperature

2. $L=19.5mH, I_{AS}=70A, R_G=20\Omega$, Starting $T_J=25$

3. $I_{SD}\leq 48A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS}$, Starting $T_J=25$

4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

5. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

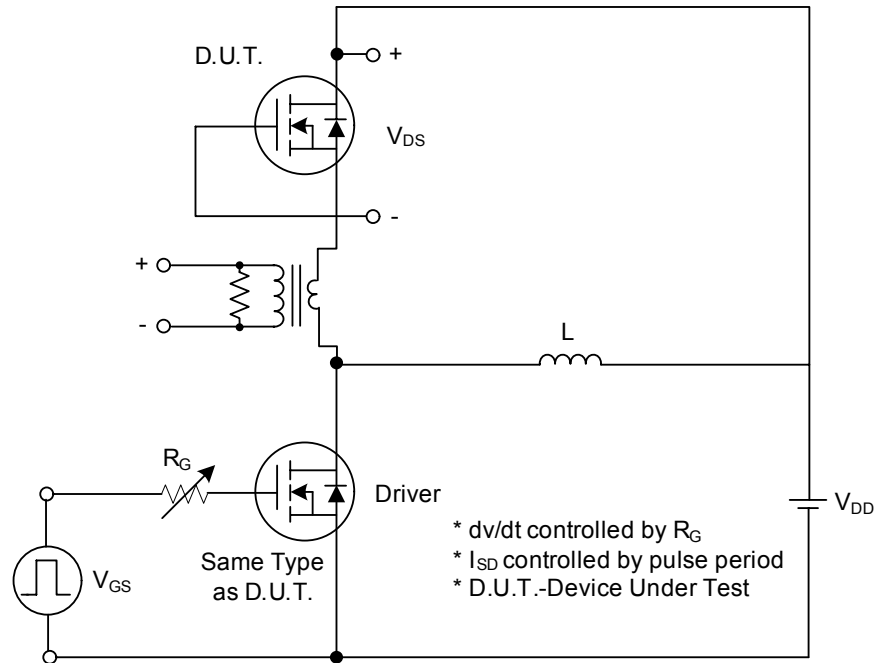


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

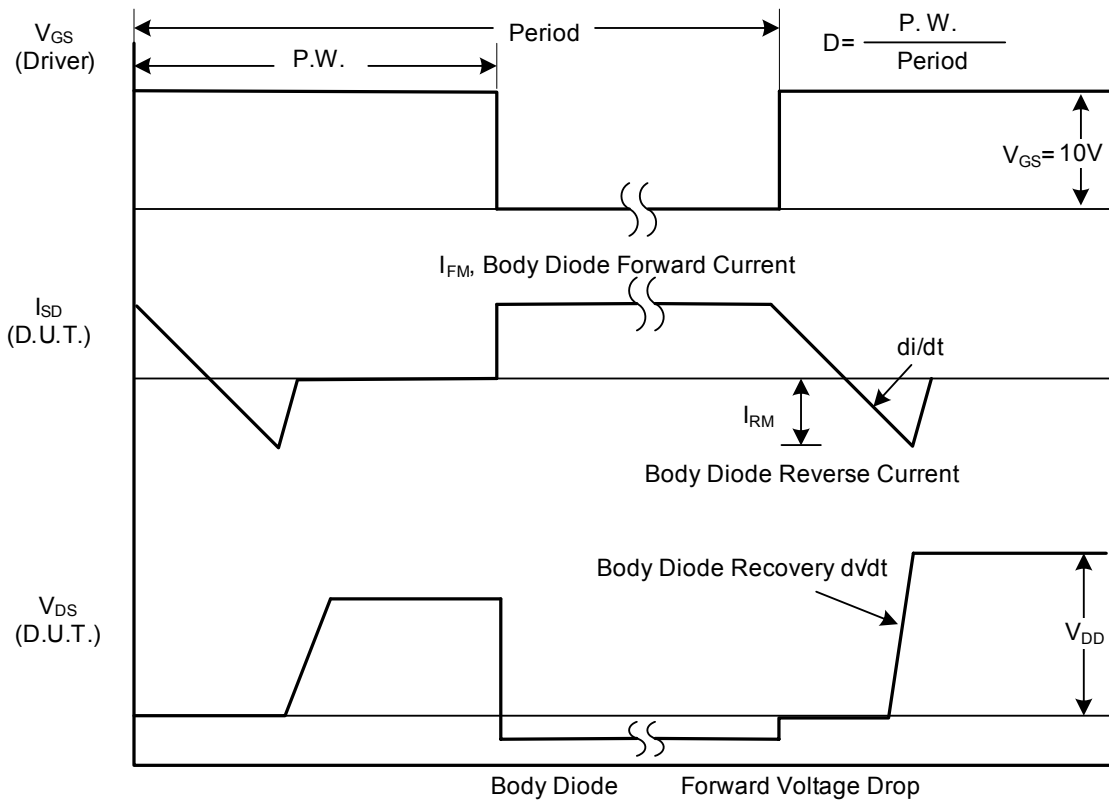


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

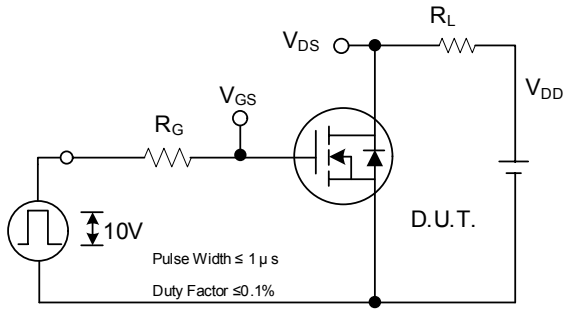


Fig. 2A Switching Test Circuit

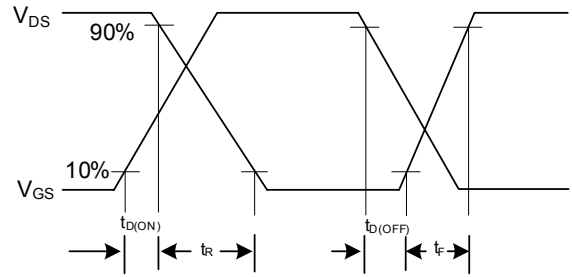


Fig. 2B Switching Waveforms

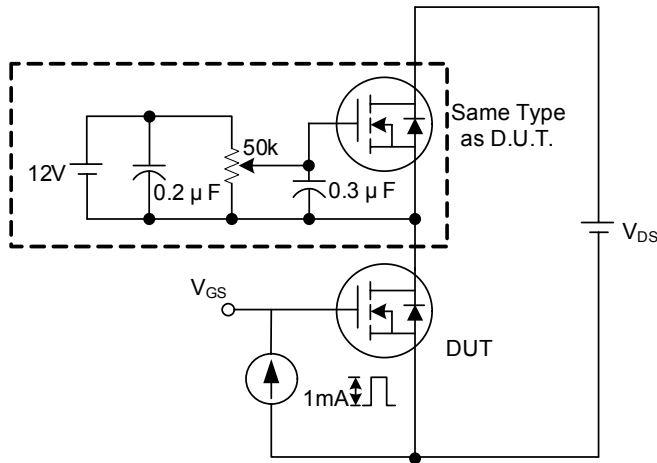


Fig. 3A Gate Charge Test Circuit

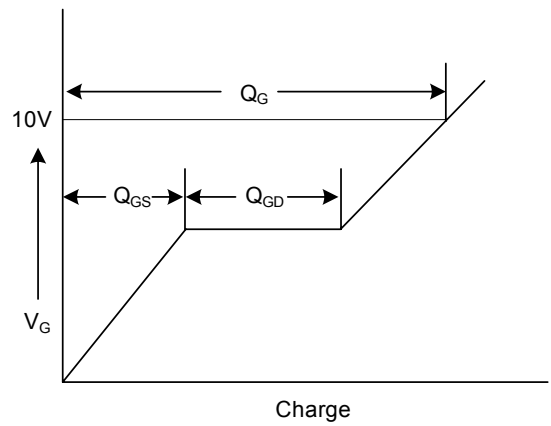


Fig. 3B Gate Charge Waveform

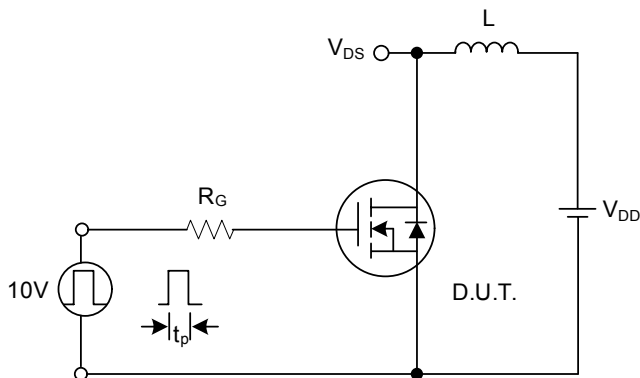


Fig. 4A Unclamped Inductive Switching Test Circuit

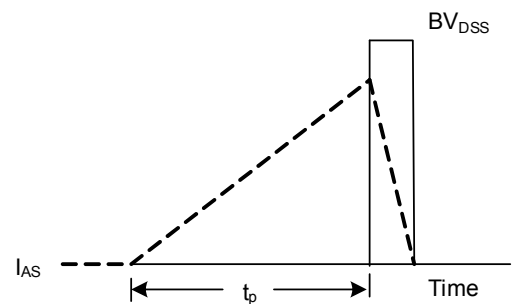
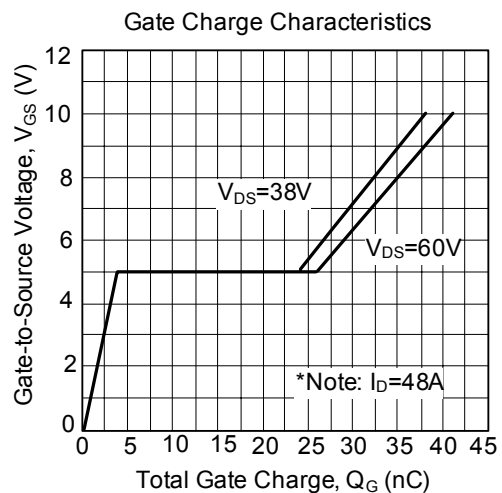
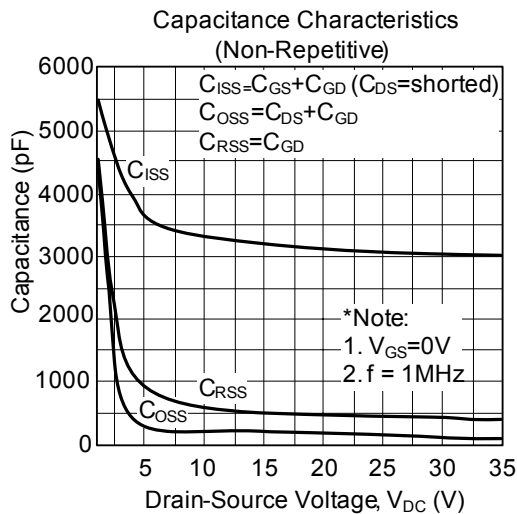
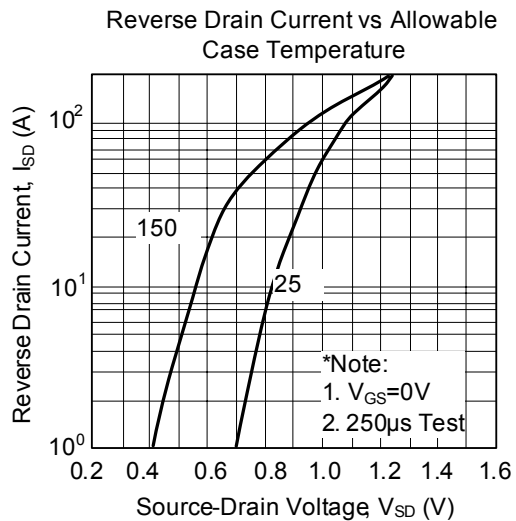
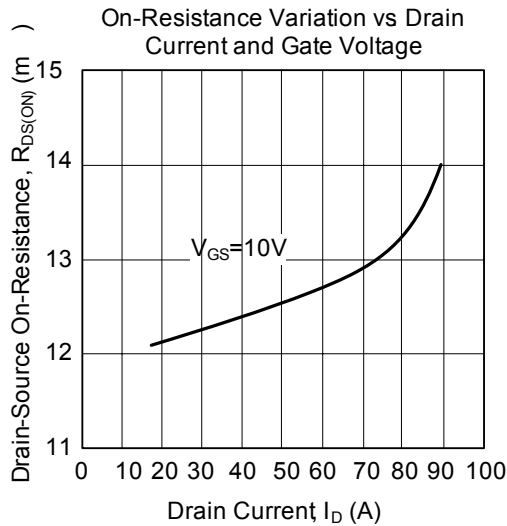
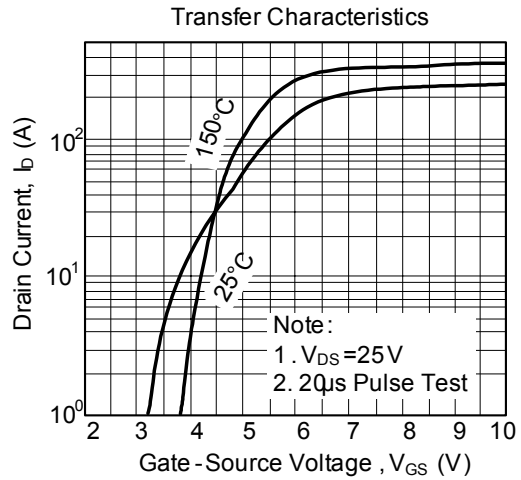
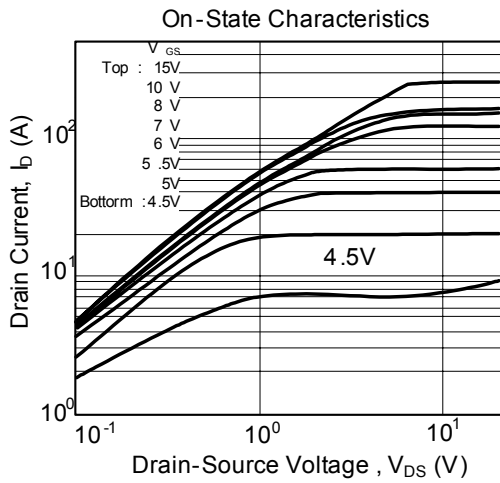
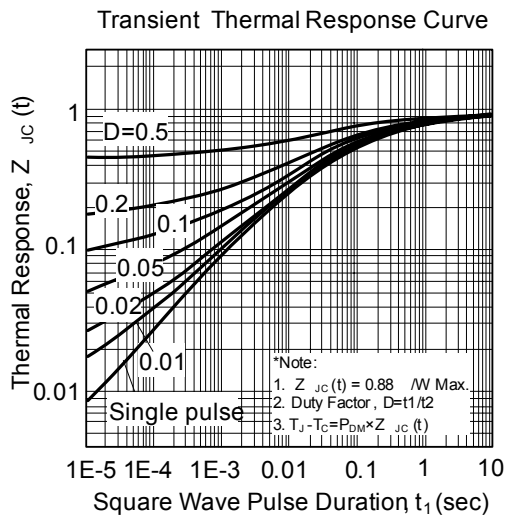
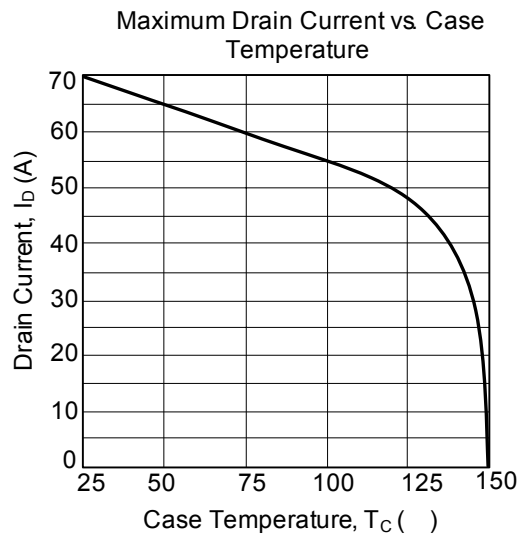
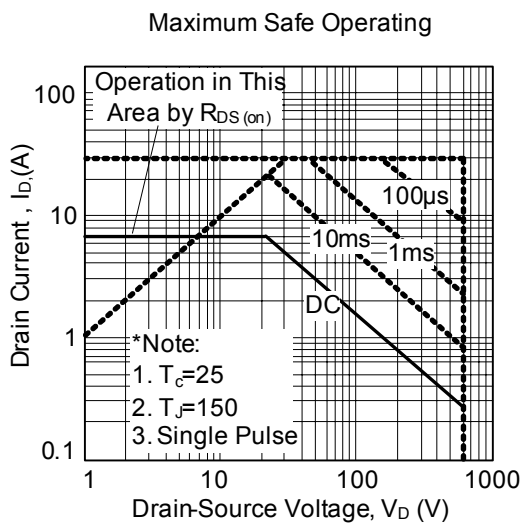
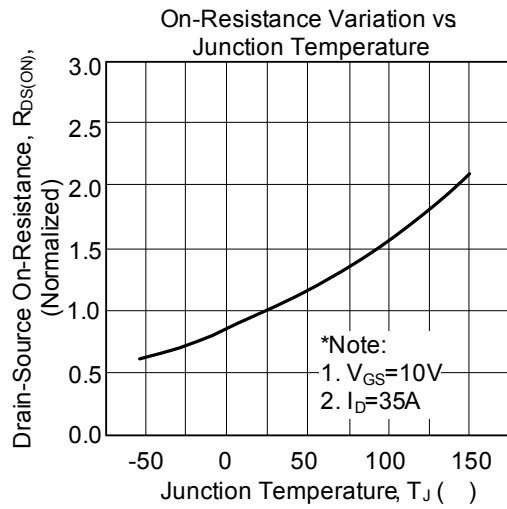
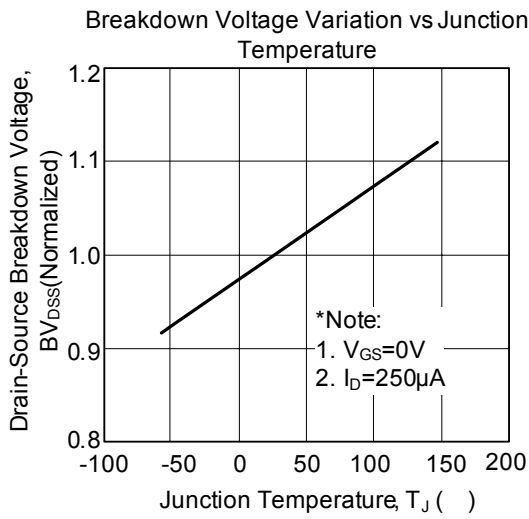


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS



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