



30N06

MOSFET

30 Amps, 60 Volts N-CHANNEL POWER MOSFET

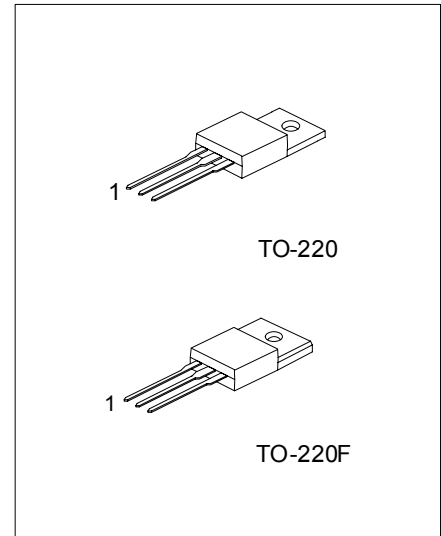
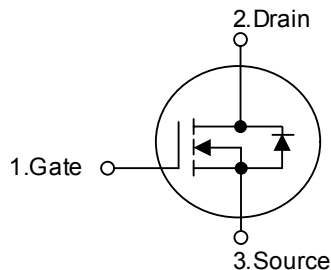
DESCRIPTION

The UTC 30N06 is a low voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and excellent avalanche characteristics. This power MOSFET is usually used at automotive applications in power supplies, high efficient DC to DC converters and battery operated products.

FEATURES

- * $R_{DS(ON)} = 40m\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 20 nC)
- * Low reverse transfer Capacitance ($C_{RSS} =$ typical 80 pF)
- * Fast switching capability
- * 100% avalanche energy specified
- * Improved dv/dt capability

SYMBOL



*Pb-free plating product number: 30N06L

ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
30N06-TA3-T	30N06L-TA3-T	TO-220	G	D	S	Tube
30N06-TF3-T	30N06L-TF3-T	TO-220F	G	D	S	Tube

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

30N06L-TA3-T (1)Packing Type (2)Package Type (3)Lead Plating	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F (3) L: Lead Free Plating Blank: Pb/Sn
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■ 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	$T_C = 25$	A
		$T_C = 100$	A
Pulsed Drain Current (Note 1)	I_{DM}	120	A
Avalanche Energy, Single Pulsed (Note 2)	E_{AS}	300	mJ
Repetitive Avalanche Energy (Note 1)	E_{AR}	8	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	7.5	V/ns
Total Power Dissipation ($T_C = 25$)	P_D	80	W
Derating Factor Above 25		0.53	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.

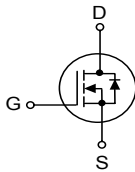
■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Thermal Resistance, Junction-to-Case	θ_{JC}			1.8	$^{\circ}\text{C/W}$
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}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Drain-Source Leakage Current		I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			1	μA
			$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}, T_J = 150$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	$V_{GS} = 20\text{V}, V_{DS} = 0\text{ V}$			100	nA
	Reverse		$V_{GS} = -20\text{V}, V_{DS} = 0\text{ V}$			-100	nA
Breakdown Voltage Temperature Coefficient		BV_{DSS}/T_J	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25		0.06		V/
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		32	40	m Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{MHz}$		800		pF
Output Capacitance		C_{OSS}			300		pF
Reverse Transfer Capacitance		C_{RSS}			80		pF
Switching Characteristics							
Turn-On Delay Time		$t_{D(ON)}$	$V_{DD} = 30\text{V}, I_D = 15\text{ A}, V_{GS} = 10\text{V}$ (Note 4, 5)		12		ns
Turn-On Rise Time		t_R			79		ns
Turn-Off Delay Time		$t_{D(OFF)}$			50		ns
Turn-Off Fall Time		t_F			52		ns
Total Gate Charge		Q_G	$V_{DS} = 60\text{V}, V_{GS} = 10\text{ V}, I_D = 24\text{A}$ (Note 4, 5)		20	30	nC
Gate-Source Charge		Q_{GS}			6		nC
Gate-Drain Charge (Miller Charge)		Q_{GD}			9		nC

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Source-Drain Diode Ratings and Characteristics						
Diode Forward Voltage	V_{SD}	$I_S = 30A, V_{GS} = 0V$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S	Integral Reverse p-n Junction Diode in the MOSFET 			30	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				120	A
Reverse Recovery Time	t_{RR}	$I_S = 30A, V_{GS} = 0V$		40		ns
Reverse Recovery Charge	Q_{RR}	$di_F / dt = 100 A/\mu s$ (Note4)		70		μC

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

2. $L=19.5mH, I_{AS}=30A, R_G=20\Omega$, Starting $T_J=25$

3. $I_{SD} \leq 50A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$, 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

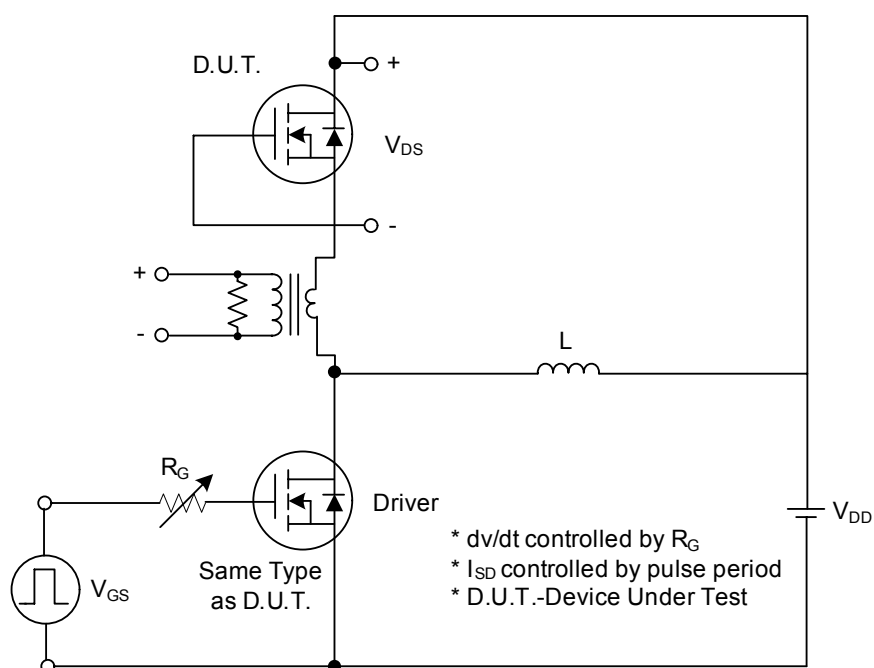


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

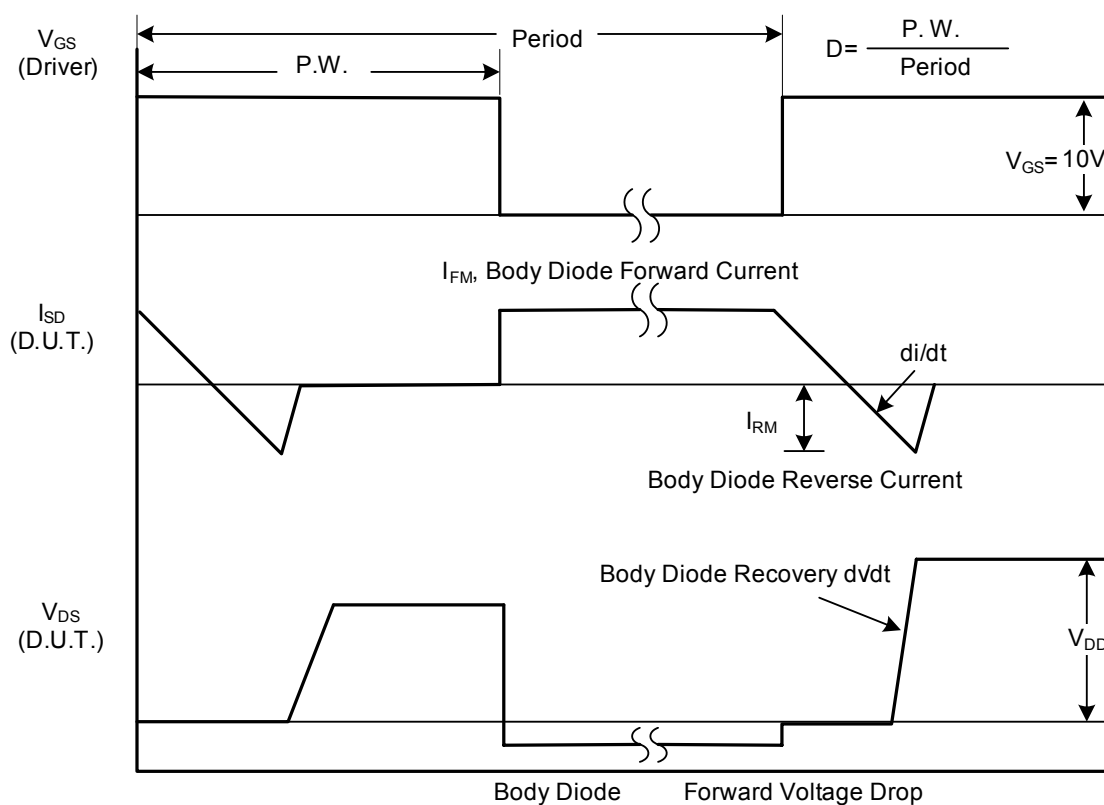


Fig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

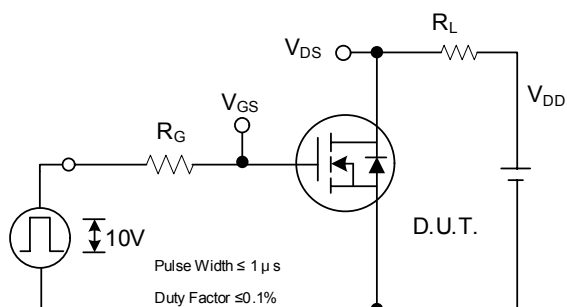


Fig. 2A Switching Test Circuit

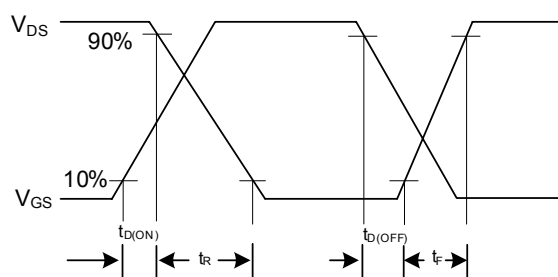


Fig. 2B Switching Waveforms

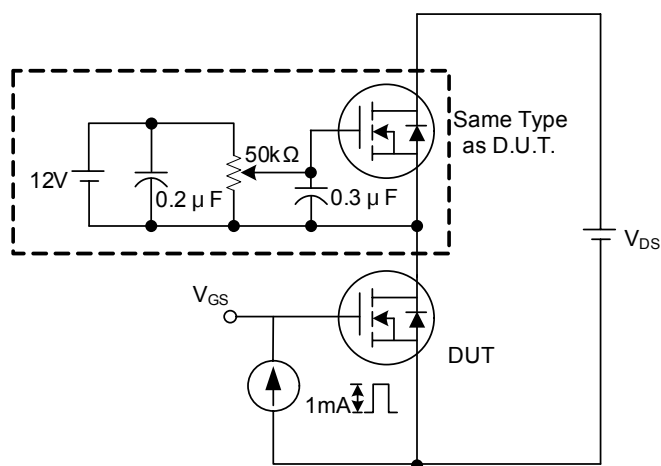


Fig. 3A Gate Charge Test Circuit

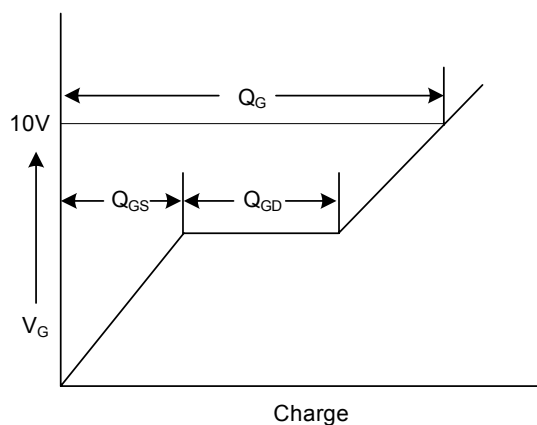


Fig. 3B Gate Charge Waveform

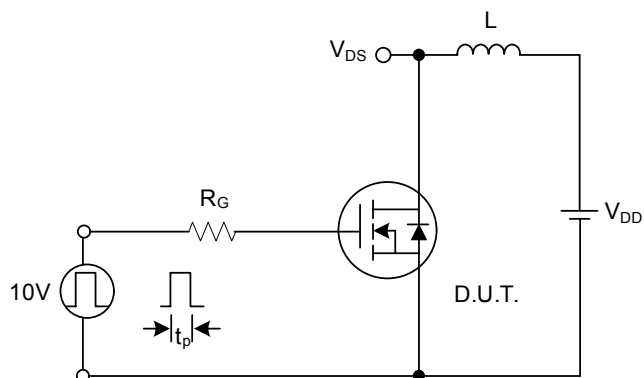


Fig. 4A Unclamped Inductive Switching Test Circuit

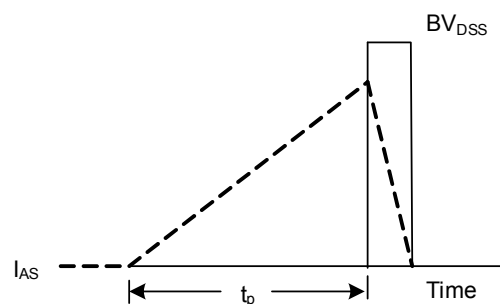
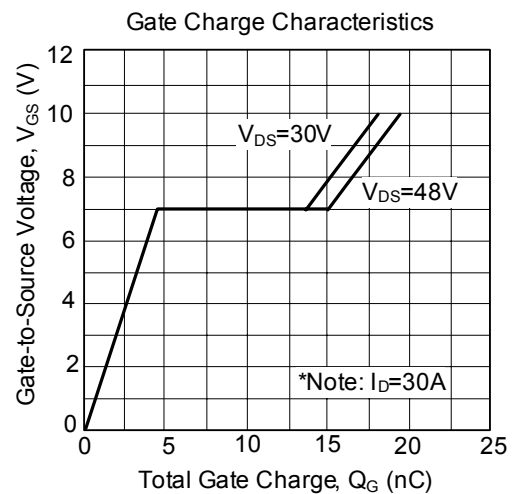
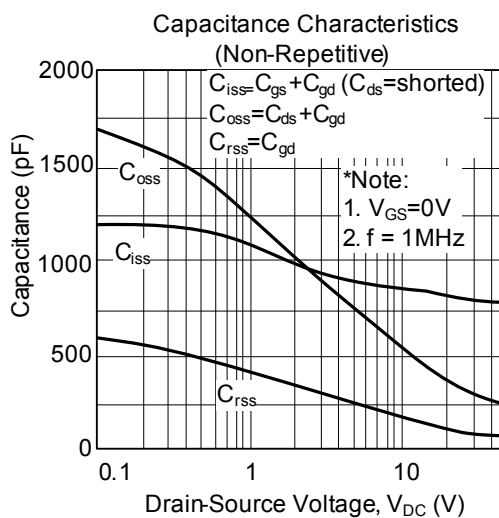
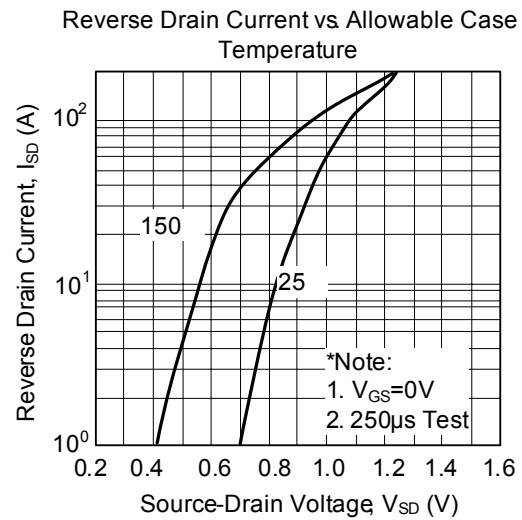
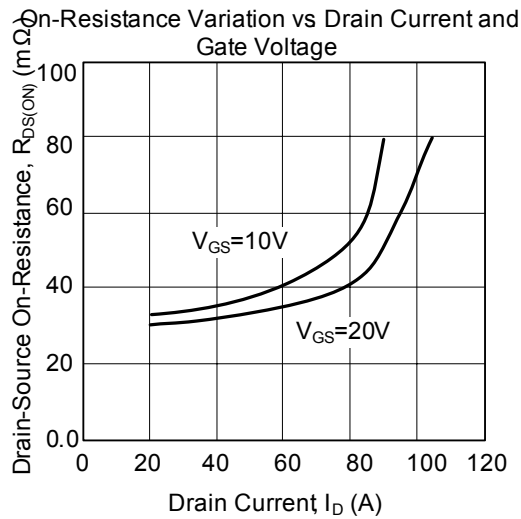
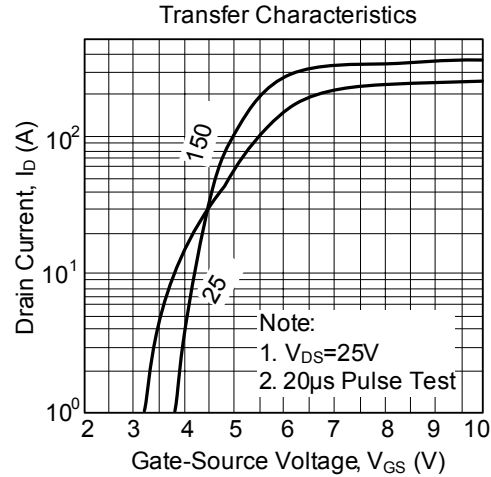
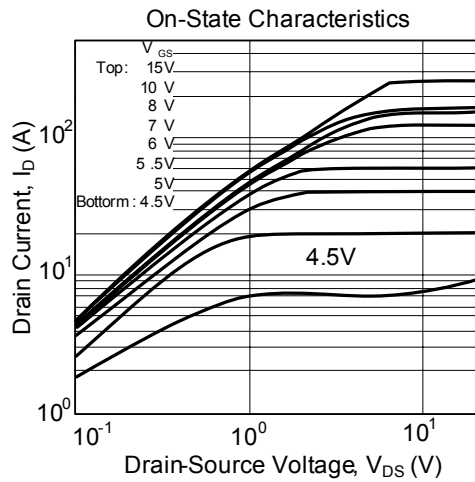
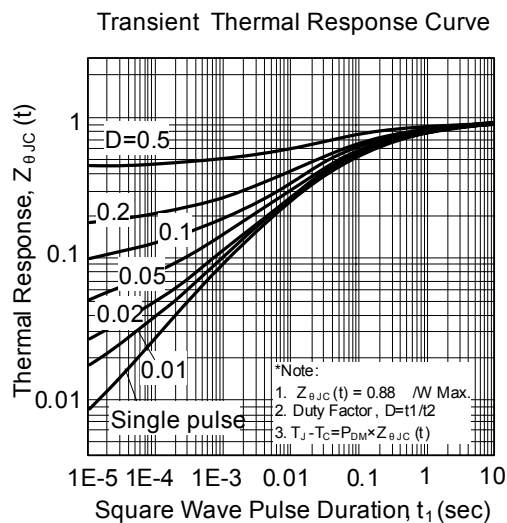
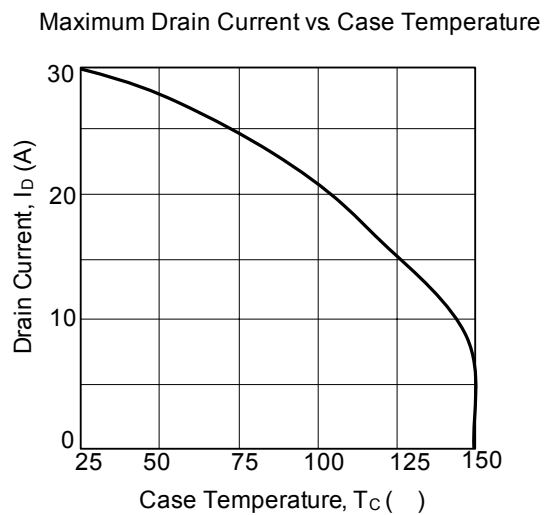
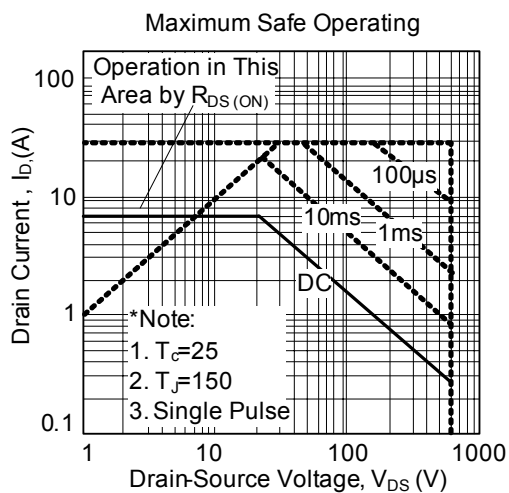
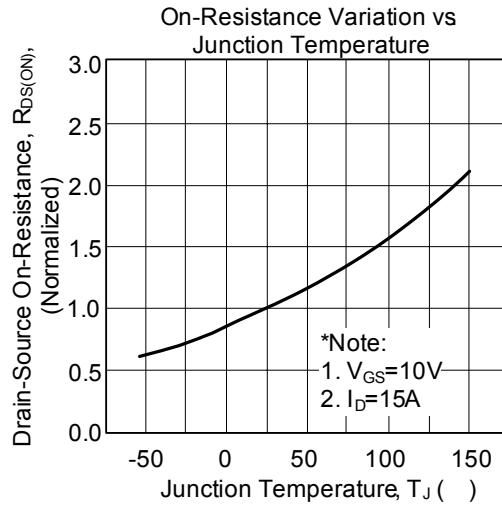
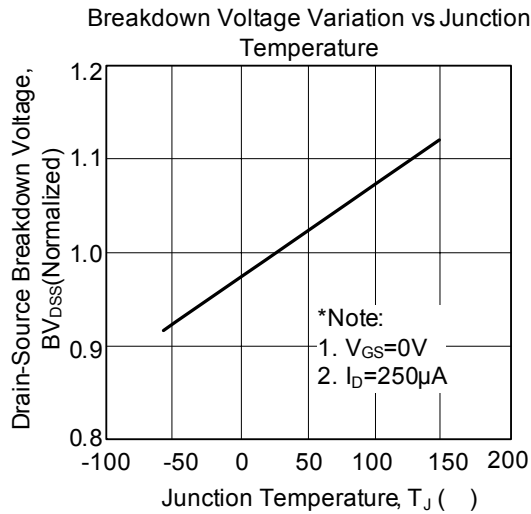


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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