



# 30N06

*Power MOSFET*

## 30 Amps, 60 Volts N-CHANNEL POWER MOSFET

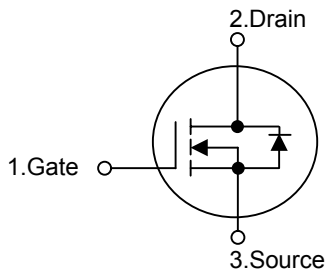
■ DESCRIPTION

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
- \* Avalanche energy specified
- \* Improved dv/dt capability

■ SYMBOL

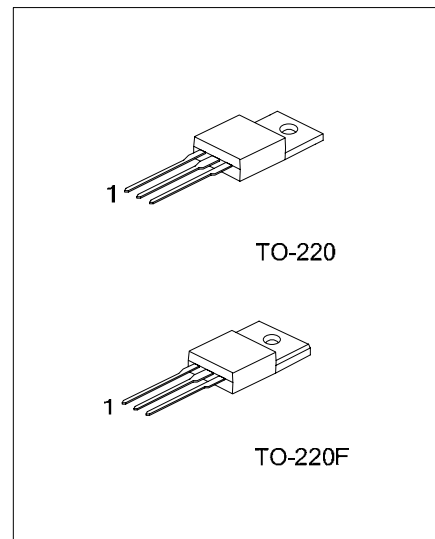


■ ORDERING INFORMATION

Ordering 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

<p>30N06L-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F (3) L: Lead Free Plating, Blank: Pb/Sn</p>
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\*Pb-free plating product number: 30N06L

### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	60	V
Gate to Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$T_C = 25$	$I_D$	30	A
	$T_C = 100$		21.3	A
Pulsed Drain Current (Note 1)		$I_{DM}$	120	A
Avalanche Energy	Single Pulsed (Note 2)	$E_{AS}$	300	mJ
	Repetitive (Note 1)	$E_{AR}$	8	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	7.5	V/ns
Power Dissipation	TO-220	$P_D$	79	W
	TO-220F		45	W/
Junction Temperature		$T_J$	+150	
Operation Temperature		$T_{OPR}$	-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	RATING	UNIT
Junction-to-Ambient	TO-220	$\theta_{JA}$	62	$^{\circ}\text{C/W}$
	TO-220F		62	$^{\circ}\text{C/W}$
Junction-to-Case	TO-220	$\theta_{JC}$	1.9	$^{\circ}\text{C/W}$
	TO-220F		2.7	$^{\circ}\text{C/W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	$\mu\text{A}$
Gate-Source Leakage Current	Forward Reverse	$I_{GSS}$	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$ $V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$		100	nA
					-100	nA
Breakdown Voltage Temperature Coefficient	$BV_{DSS}/T_J$	$I_D = 250\ \mu\text{A}$ , Referenced to 25		0.06		V/
<b>ON CHARACTERISTICS</b>						
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	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		32	40	m $\Omega$
<b>DYNAMIC CHARACTERISTICS</b>						
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
<b>SWITCHING CHARACTERISTICS</b>						
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	$Q_{GD}$			9		nC

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 30\text{ A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				30	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				120	A
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, I_S = 30\text{ A},$		40		ns
Reverse Recovery Charge	$Q_{RR}$	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note4)		70		$\mu\text{C}$

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

2.  $L=0.66\text{mH}, I_{AS}=30\text{A}, V_{DD}=25\text{V}, R_G=20\Omega$ , Starting  $T_J=25$

3.  $I_{SD}\leq 50\text{A}, di/dt\leq 300\text{A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25$

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

5. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

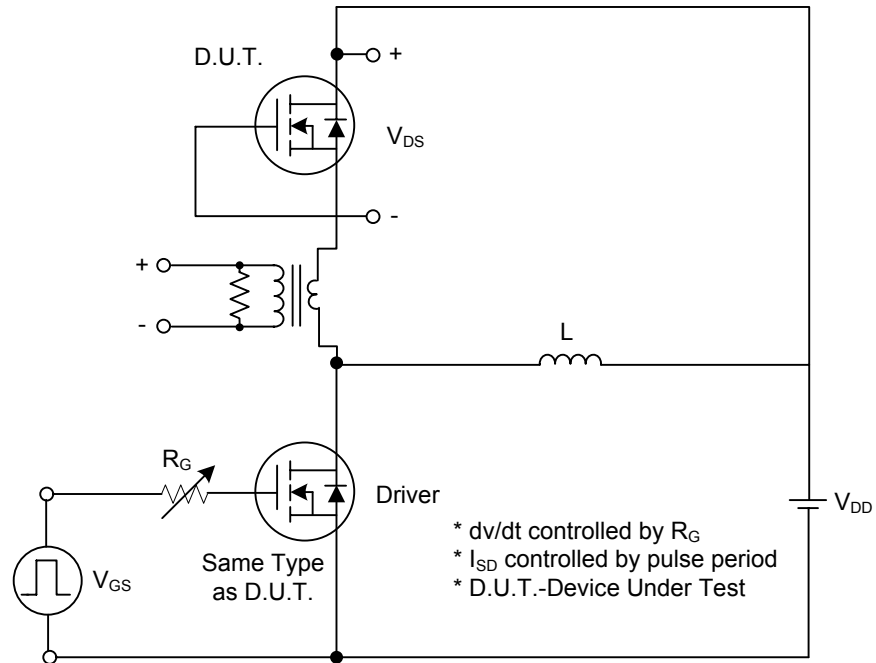


Fig. 1A Peak Diode Recovery  $dv/dt$  Test Circuit

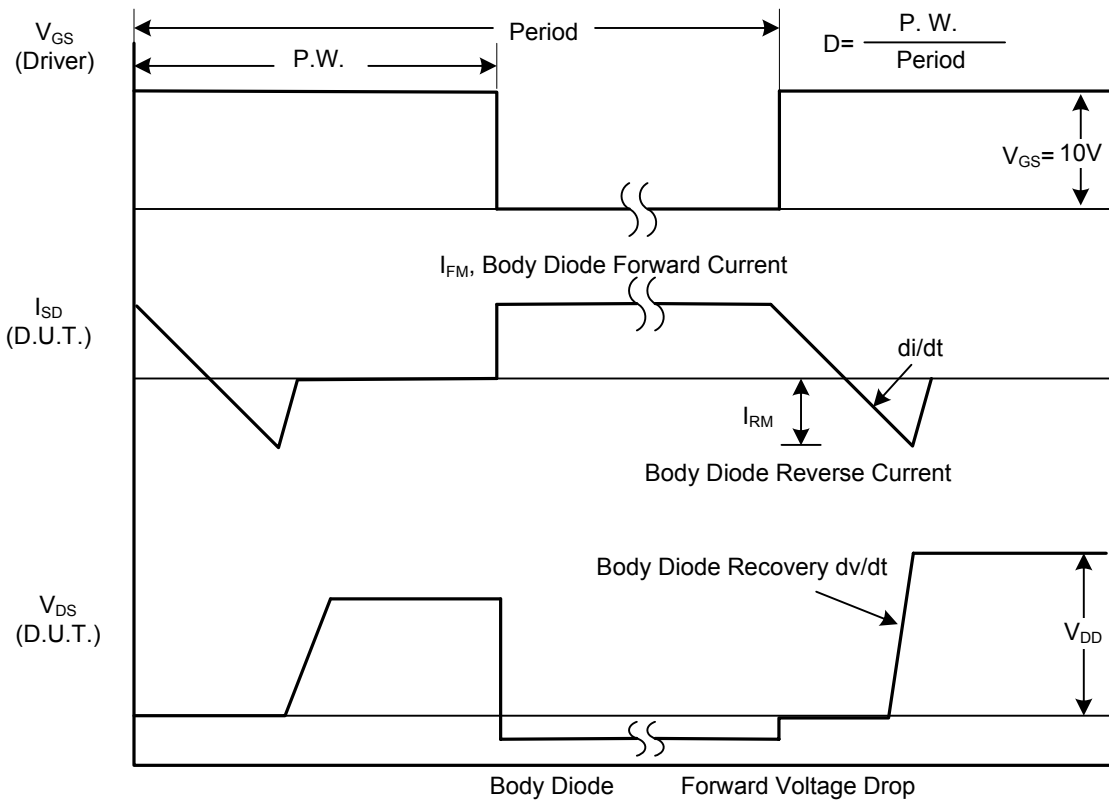


Fig. 1B Peak Diode Recovery  $dv/dt$  Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

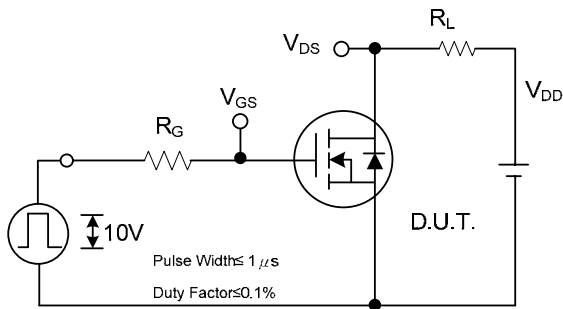


Fig. 2A Switching Test Circuit

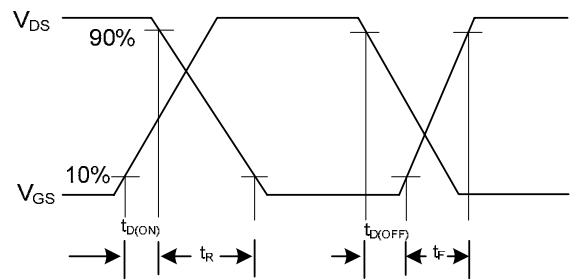


Fig. 2B Switching Waveforms

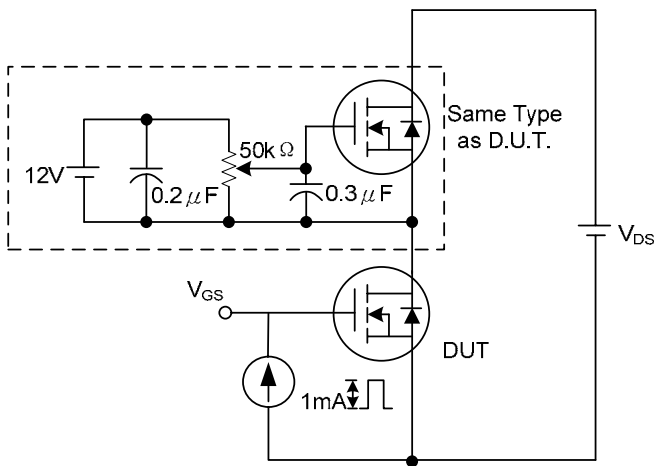


Fig. 3A Gate Charge Test Circuit

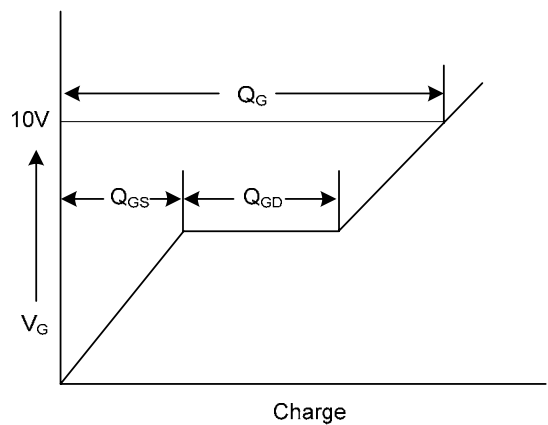


Fig. 3B Gate Charge Waveform

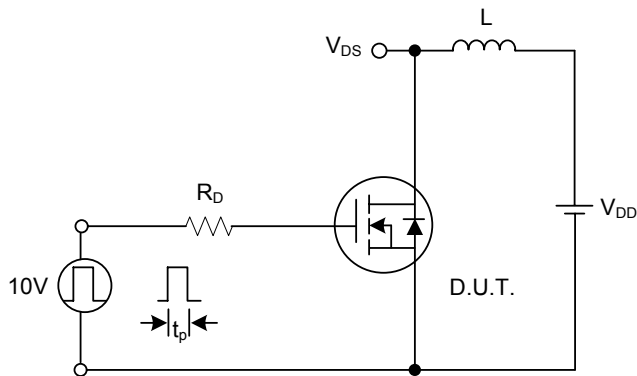


Fig. 4A Unclamped Inductive Switching Test Circuit

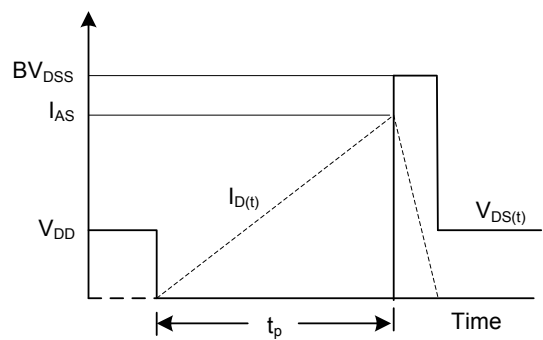
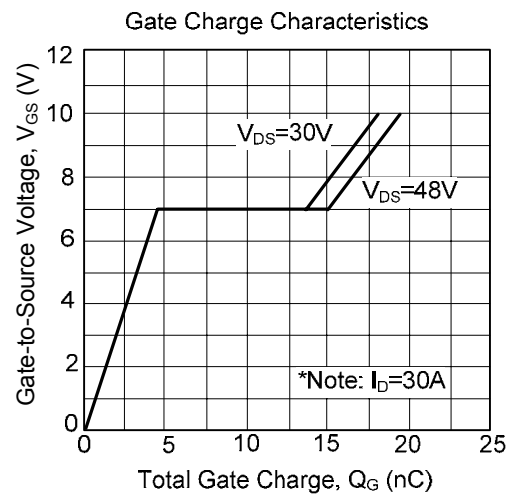
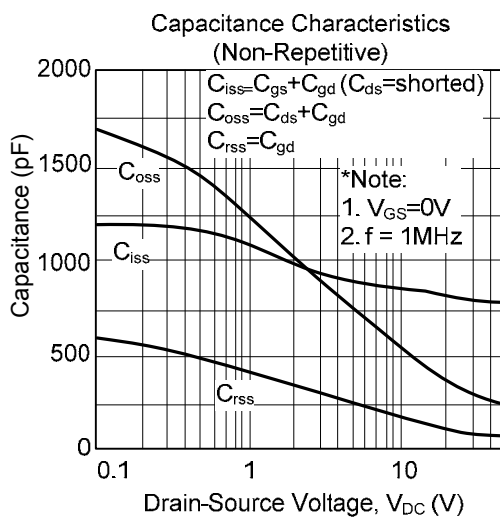
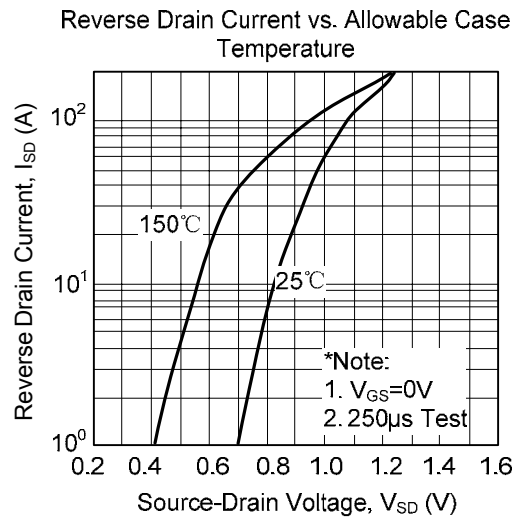
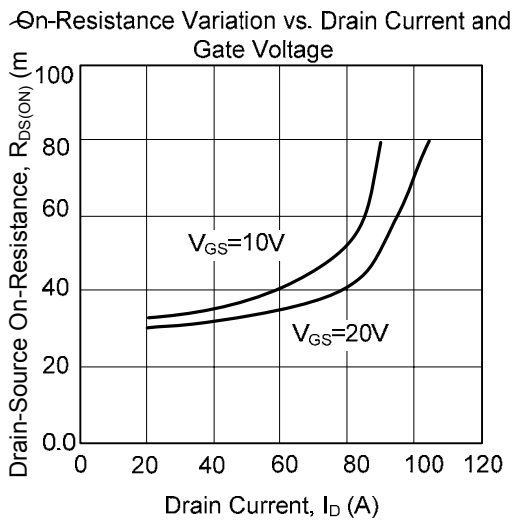
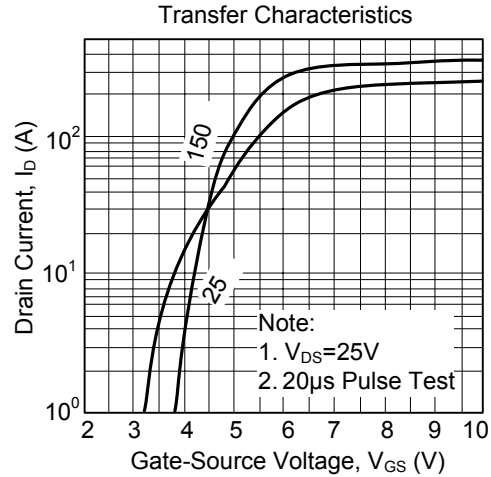
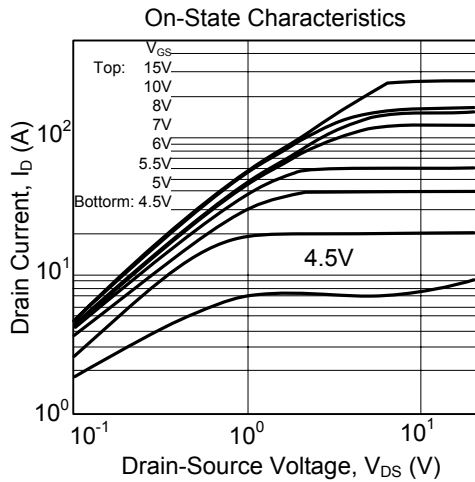
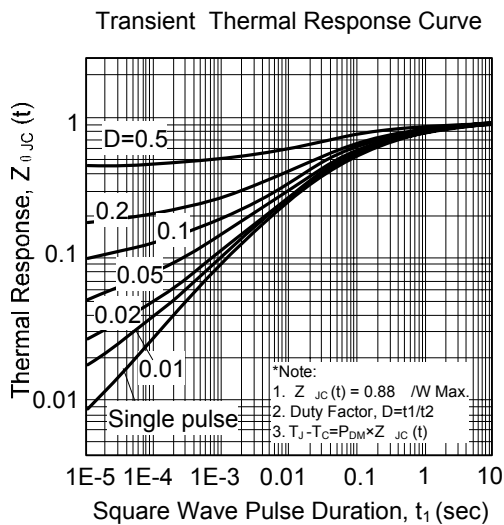
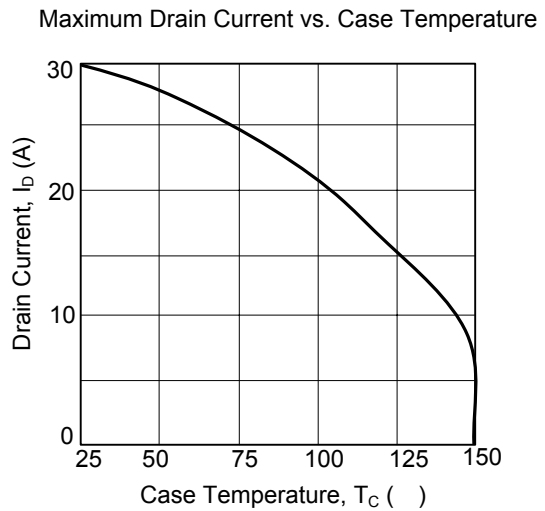
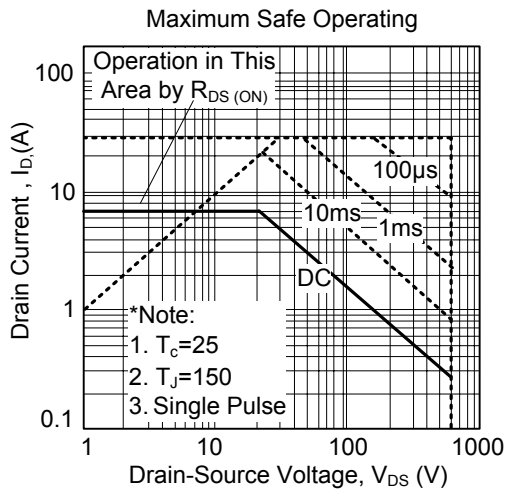
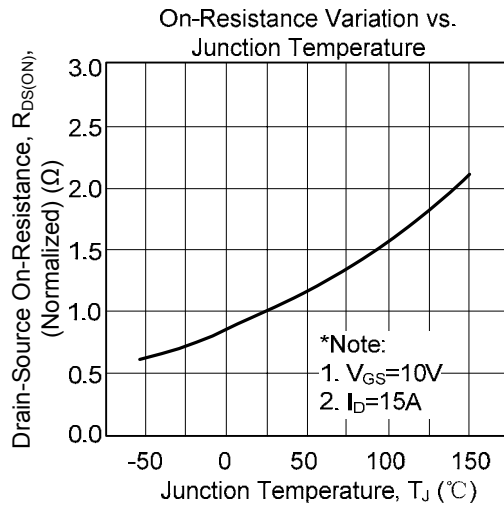
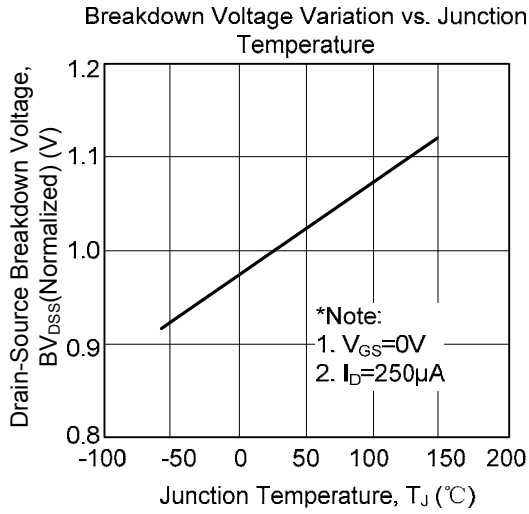


Fig. 4B Unclamped Inductive Switching Waveforms

## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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