



50N06

Power MOSFET

50A, 60V N-CHANNEL POWER MOSFET

■ DESCRIPTION

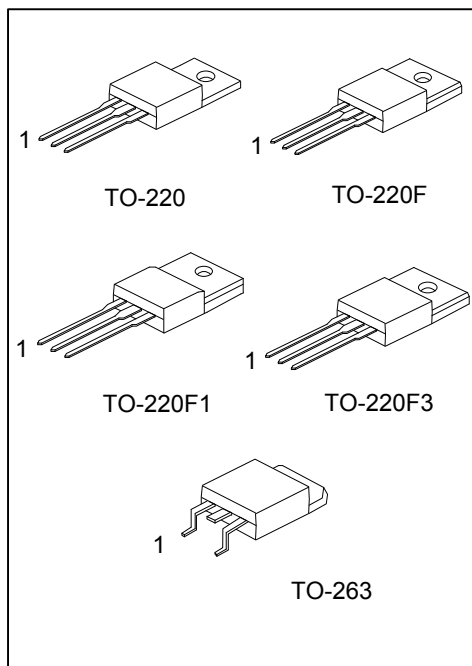
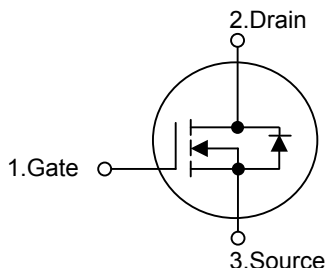
The UTC **50N06** is three-terminal silicon device with current conduction capability of about 50A, fast switching speed. Low on-state resistance, breakdown voltage rating of 60V, and max threshold voltages of 4 volt.

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

■ FEATURES

- * $R_{DS(ON)} \leq 23m\Omega @ V_{GS}=10V, I_D=25A$
- * Fast switching capability
- * 100% avalanche energy specified
- * Improved dv/dt capability

■ SYMBOL



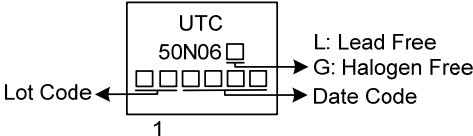
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
50N06L-TA3-T	50N06G-TA3-T	TO-220	G	D	S	Tube
50N06L-TF1-T	50N06G-TF1-T	TO-220F1	G	D	S	Tube
50N06L-TF3-T	50N06G-TF3-T	TO-220F	G	D	S	Tube
50N06L-TF3T-T	50N06G-TF3T-T	TO-220F3	G	D	S	Tube
50N06L-TQ2-T	50N06G-TQ2-T	TO-263	G	D	S	Tube
50N06L-TQ2-R	50N06G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>50N06G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F, TF3T: TO-220F3, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current		I_D	50	A
Pulsed Drain Current (Note 2)		I_{DM}	150	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	205	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	3.6	V/ns
Power Dissipation ($T_C=25^\circ\text{C}$)	TO-220/TO-263	P_D	120	W
	TO-220F/TO-220F1		70	W
	TO-220F3			
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operation and Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Notes: 1. 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.

2. Repetitive Rating : Pulse width limited by maximum junction temperature.

3. $L=0.1\text{mH}$, $I_{AS}=64\text{A}$, $V_{DD}=25\text{V}$, $R_G=20\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F3 TO-263	θ_{JA}	62	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.24	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		1.78	$^\circ\text{C}/\text{W}$
	TO-220F3			
	TO-263		1.24	$^\circ\text{C}/\text{W}$

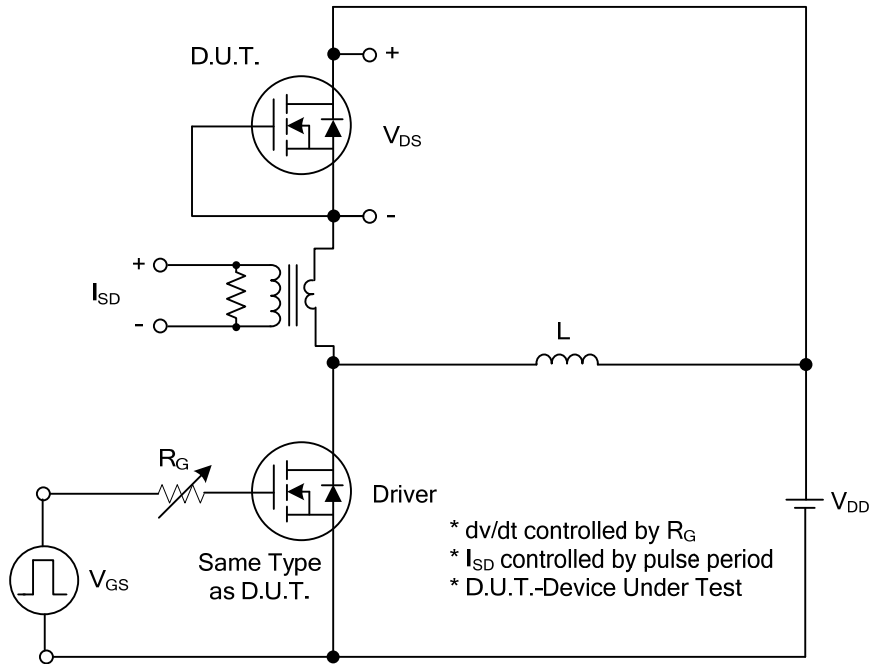
■ ELECTRICAL CHARACTERISTICS (T_C = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	60			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}			100	nA
	Reverse					
		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =25A			23	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1MHz		1200		pF
Output Capacitance	C _{OSS}			580		pF
Reverse Transfer Capacitance	C _{RSS}			180		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A I _G =100μA (Note1,2)		145		nC
Gate-Source Charge	Q _{GS}			10		nC
Gate-Drain Charge	Q _{GD}			36		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =50A, R _G =25Ω (Note1,2)		18		ns
Turn-On Rise Time	t _R			84		ns
Turn-Off Delay Time	t _{D(OFF)}			62		ns
Turn-Off Fall Time	t _F			48		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				50	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				150	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =50A, V _{GS} =0V			1.5	V
Reverse Recovery Time	t _{rr}	I _S =30A, V _{GS} =0V		90		ns
Reverse Recovery Charge	Q _{rr}	di/dt=100A/μs		260		nC

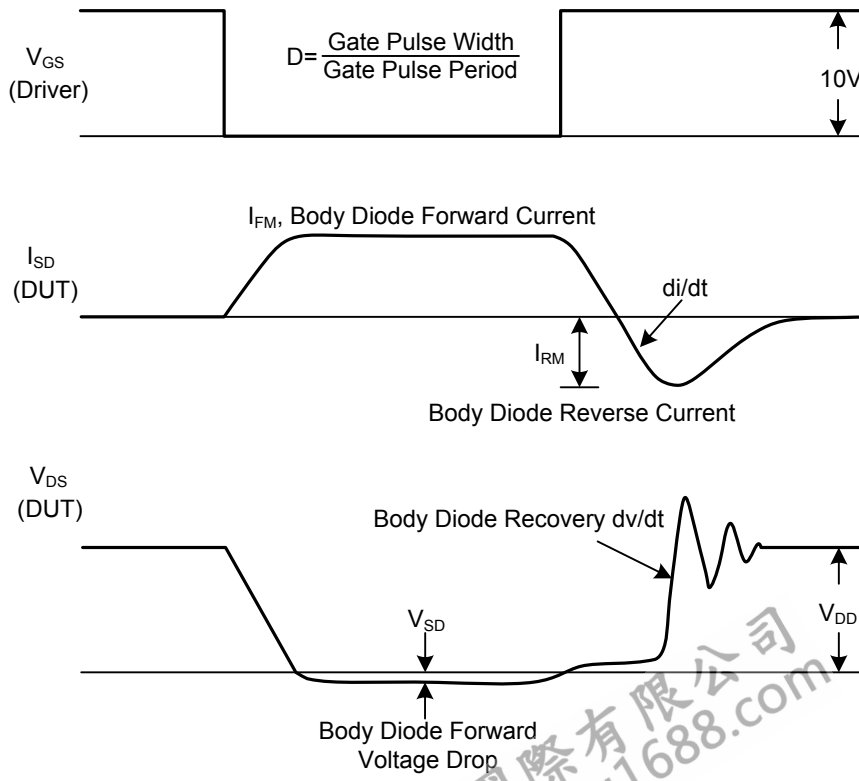
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

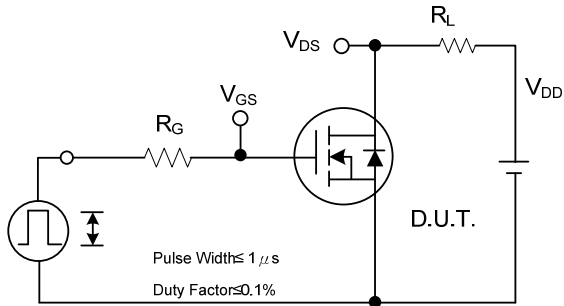


Fig. 2A Switching Test Circuit

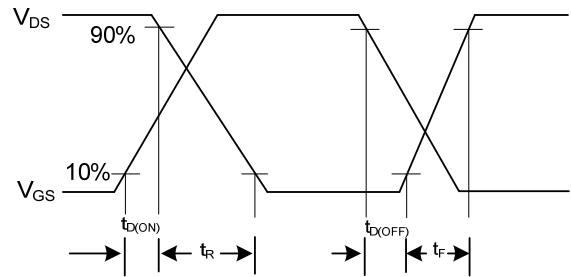


Fig. 2B Switching Waveforms

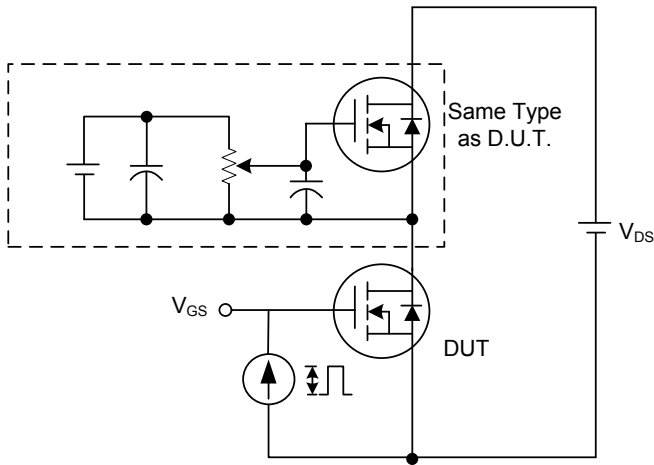


Fig. 3A Gate Charge Test Circuit

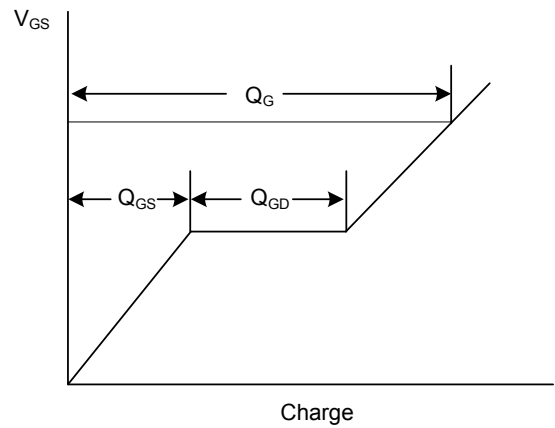


Fig. 3B Gate Charge Waveform

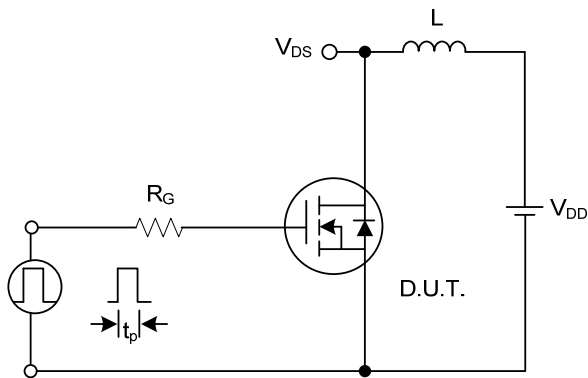


Fig. 4A Unclamped Inductive Switching Test Circuit

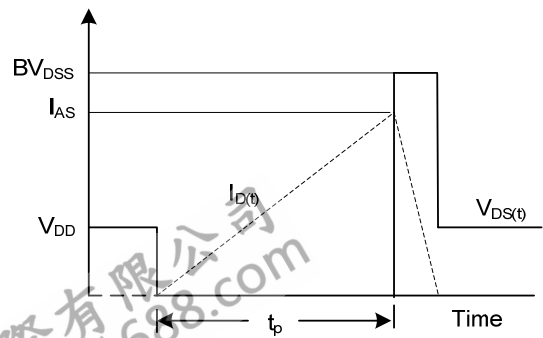
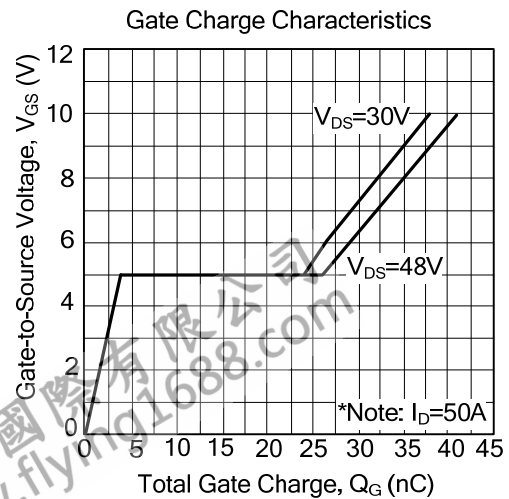
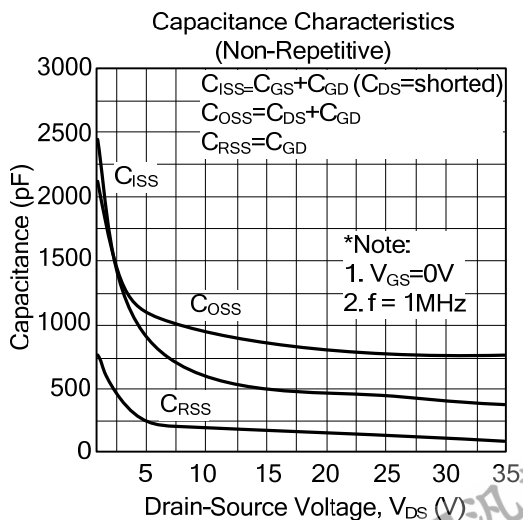
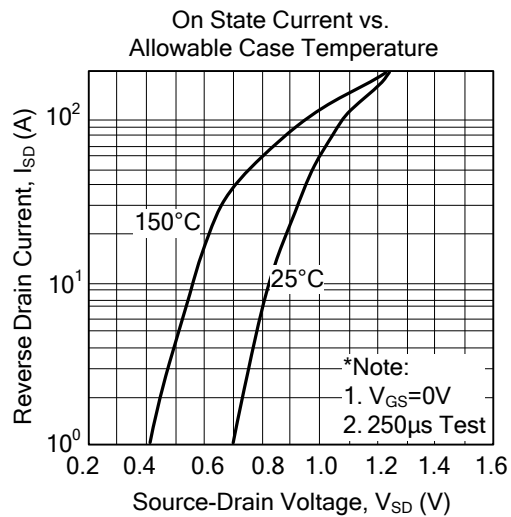
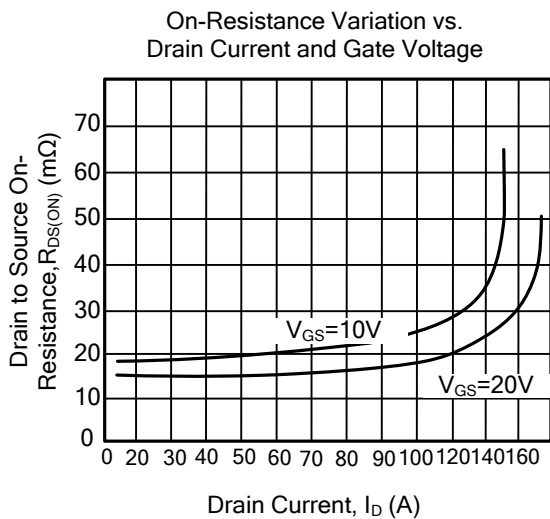
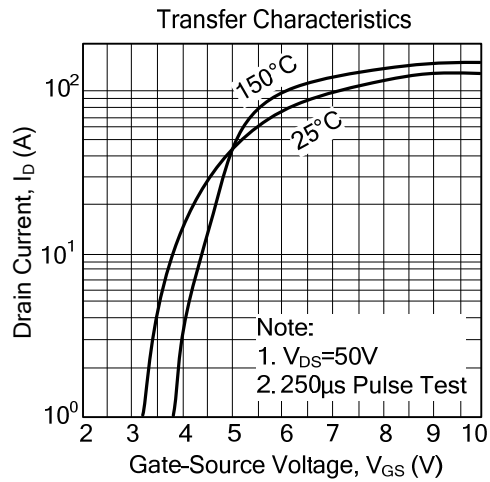
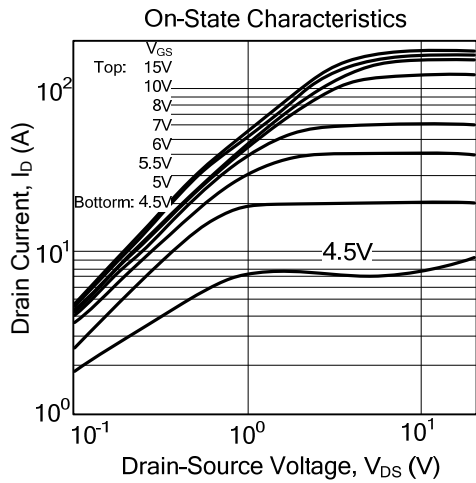
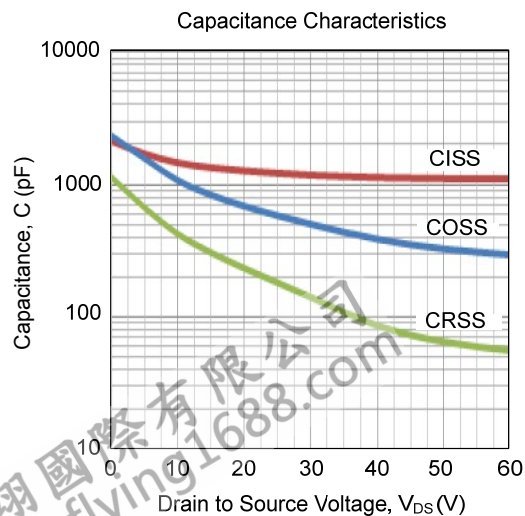
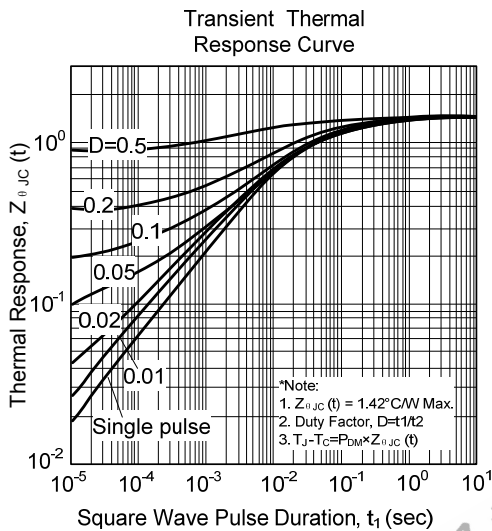
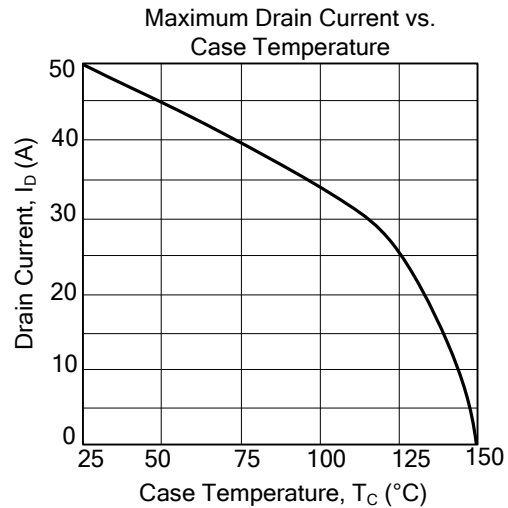
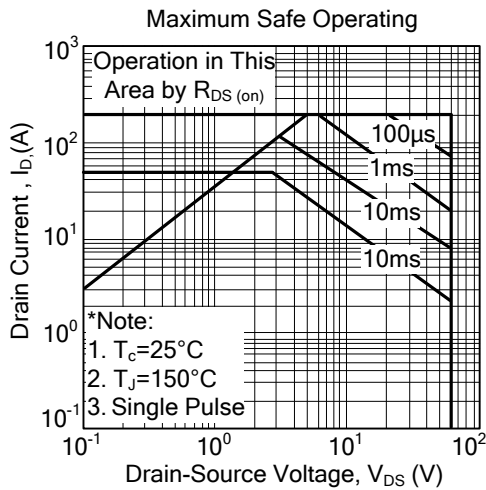
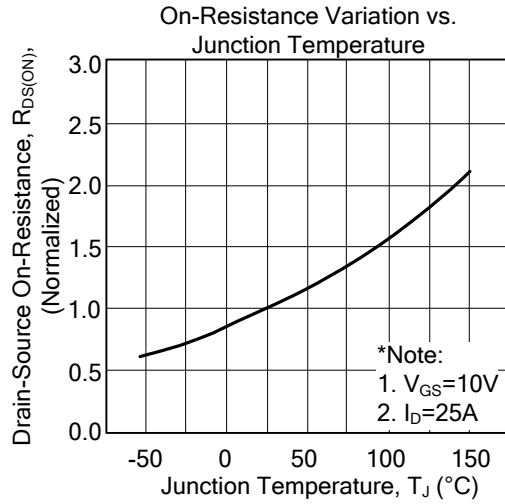
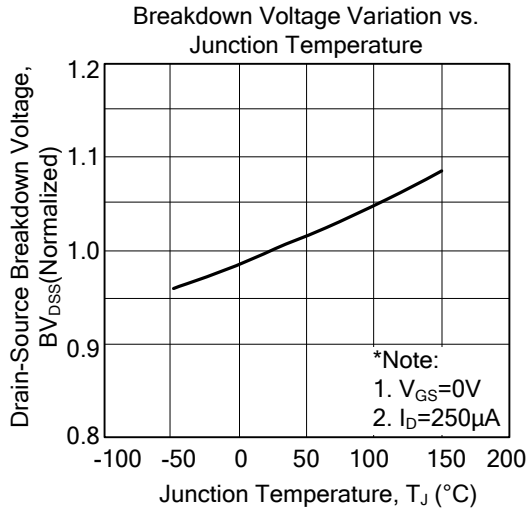


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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