



50N06-F

Power MOSFET

50 Amps, 60 Volts N-CHANNEL POWER MOSFET

■ DESCRIPTION

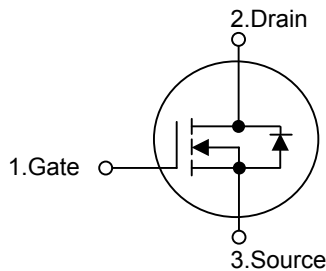
The UTC **50N06-F** is three-terminal silicon device with current conduction capability of about 50A, fast switching speed. Low on-state resistance, breakdown voltage rating of 60V, and max threshold voltages of 4 volt.

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

■ FEATURES

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

■ SYMBOL



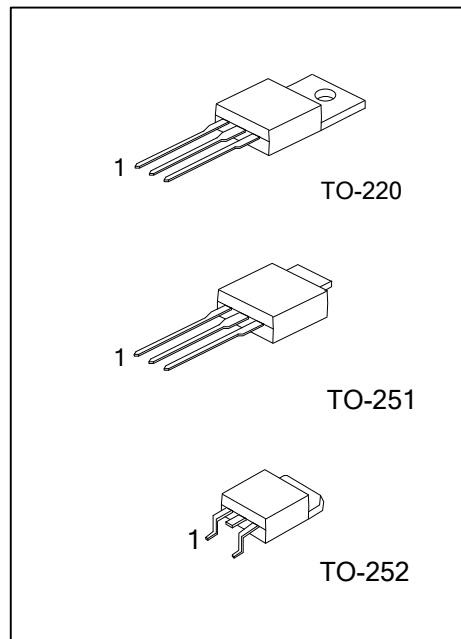
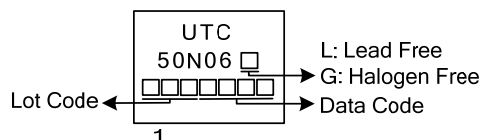
■ ORDERING INFORMATION

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-TM3-R	50N06G-TM3-R	TO-251	G	D	S	Tube
50N06L-TN3-R	50N06G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>50N06L-TA3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) TA3: TO-220, TM3: TO-251, TN3: TO-252</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	50	A
	$T_C = 100^\circ\text{C}$		35	A
Pulsed Drain Current (Note 2)		I_{DM}	200	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	480	mJ
	Repetitive (Note 2)	E_{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	7	V/ns
Power Dissipation ($T_C=25^\circ\text{C}$)	TO-220	P_D	120	W
	TO-251/TO-252		46	W
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 T_J

3. $L=0.38\text{mH}$, $I_{AS}=50\text{A}$, $V_{DD}=25\text{V}$, $R_G=20\Omega$, Starting $T_J=25^\circ\text{C}$

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

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220	θ_{JA}	62	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		100	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.24	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.7	$^\circ\text{C}/\text{W}$

■ 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} = 0 V, I _D = 250 μA	60			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}			100	nA
	Reverse				-100	nA
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D = 250 μA, Referenced to 25°C		0.07		V/°C
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 = 25 A		18	23	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, V _{DS} = 25 V f = 1MHz		900	1220	pF
Output Capacitance	C _{OSS}		430	550	pF	
Reverse Transfer Capacitance	C _{RSS}		80	100	pF	
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} = 50V, V _{GS} = 10 V I _D = 1.3A (Note 1, 2)		60	80	nC
Gate-Source Charge	Q _{GS}		9		nC	
Gate-Drain Charge	Q _{GD}		20		nC	
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 30V, I _D = 0.5 A, R _G = 25Ω (Note 1, 2)		60	80	ns
Turn-On Rise Time	t _R		180	220	ns	
Turn-Off Delay Time	t _{D(OFF)}		300	350	ns	
Turn-Off Fall Time	t _F		200	250	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}				200	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S = 50A, V _{GS} = 0 V			1.5	V
Reverse Recovery Time	t _{RR}	I _S = 50A, V _{GS} = 0 V dI _F / dt = 100 A/μs		54		ns
Reverse Recovery Charge	Q _{RR}		81		μC	

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

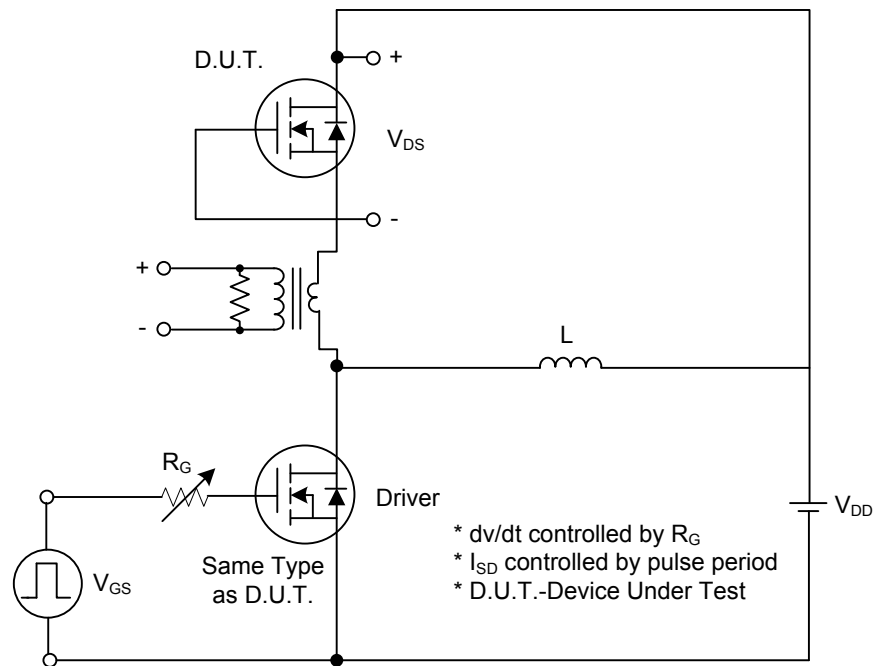


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

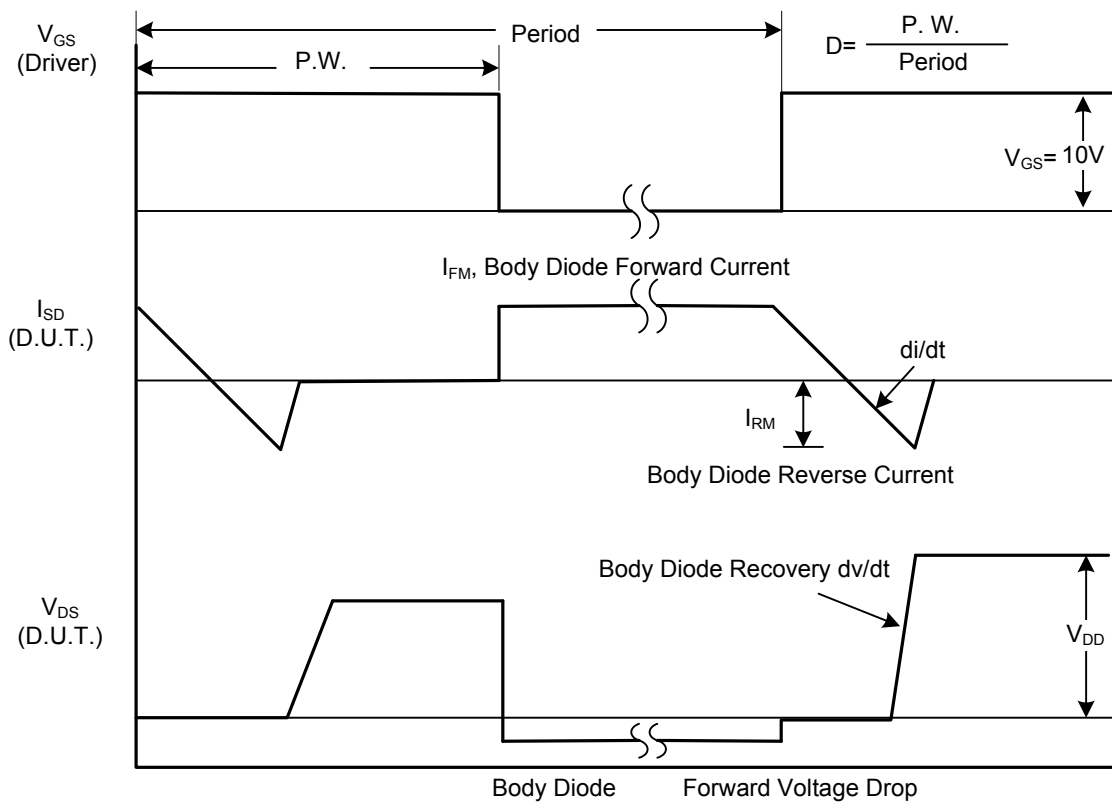


Fig. 1B Peak Diode Recovery dv/dt Waveforms

TEST CIRCUITS AND WAVEFORMS (Cont.)

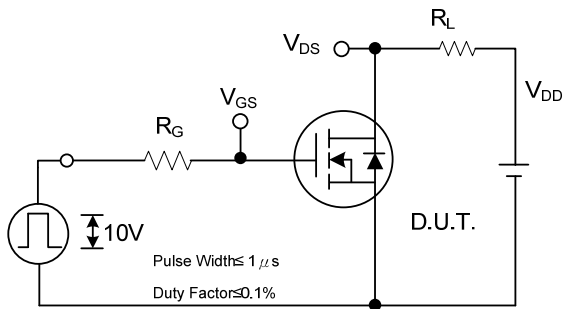


Fig. 2A Switching Test Circuit

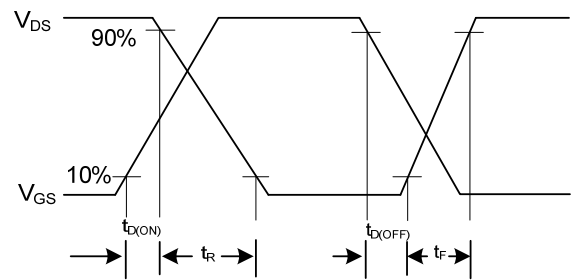


Fig. 2B Switching Waveforms

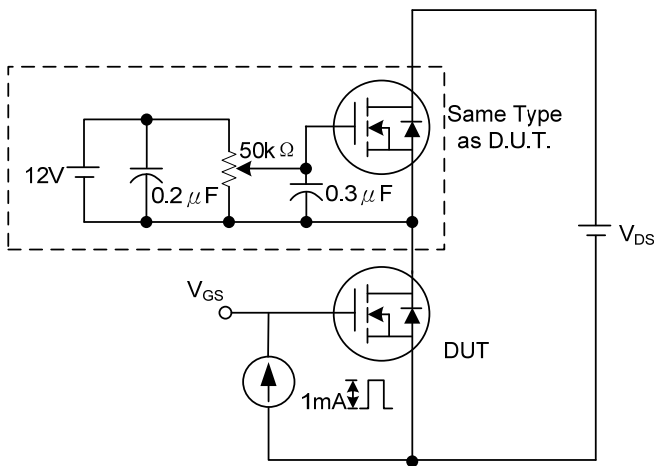


Fig. 3A Gate Charge Test Circuit

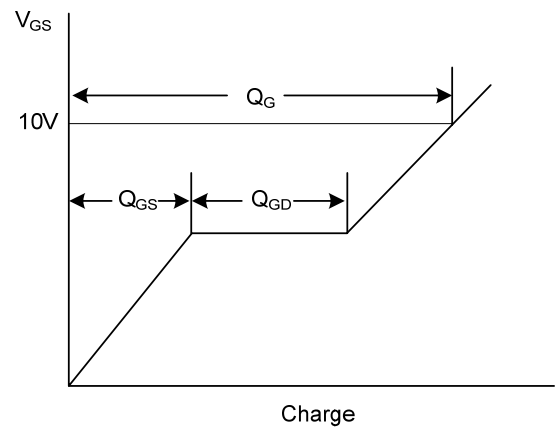


Fig. 3B Gate Charge Waveform

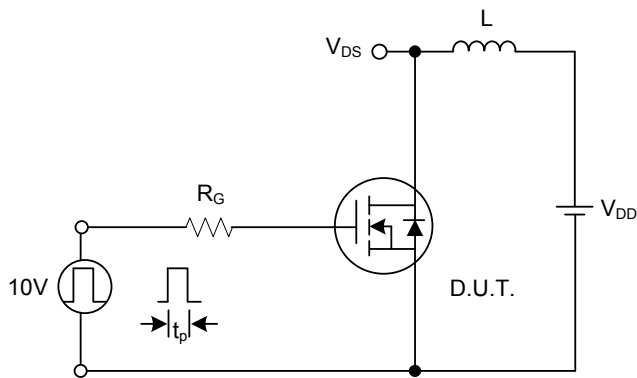


Fig. 4A Unclamped Inductive Switching Test Circuit

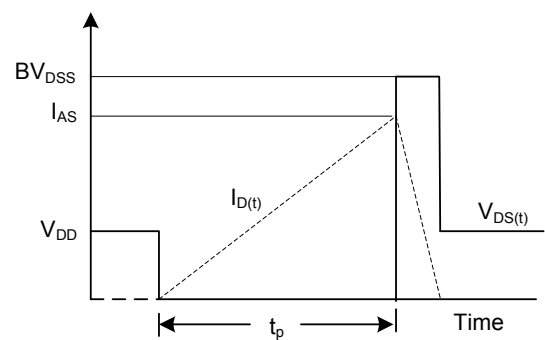
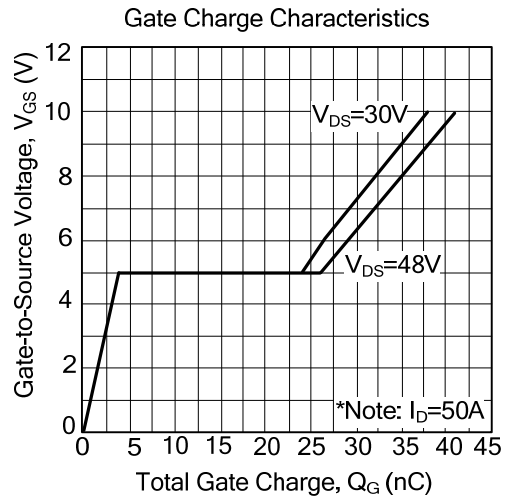
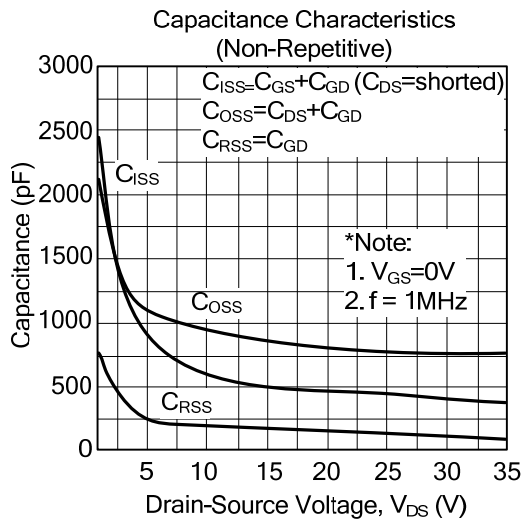
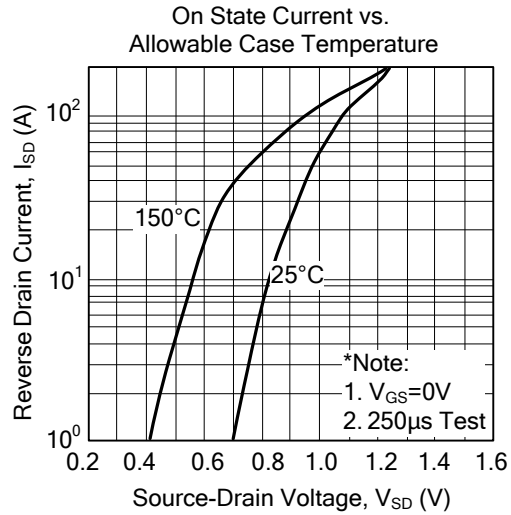
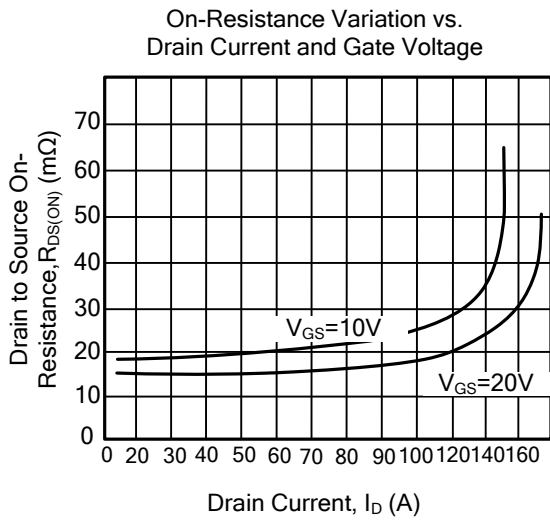
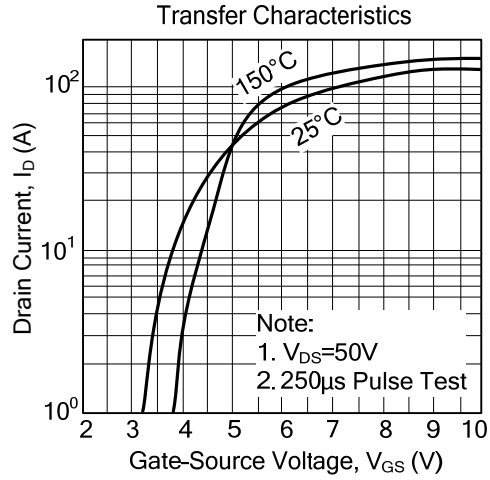
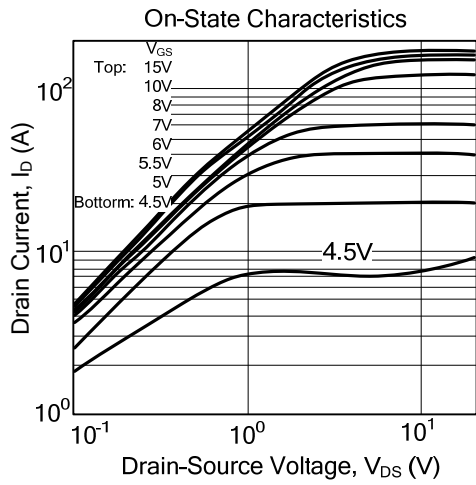
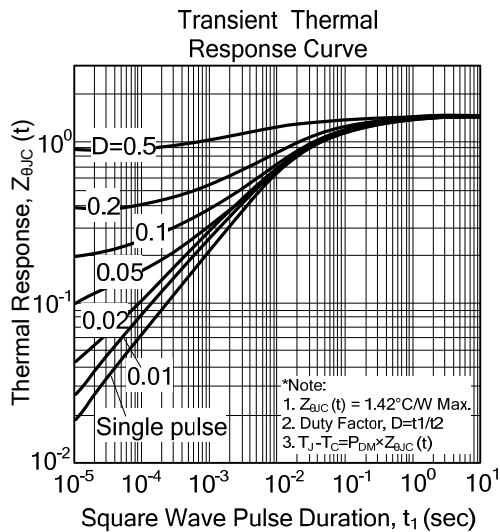
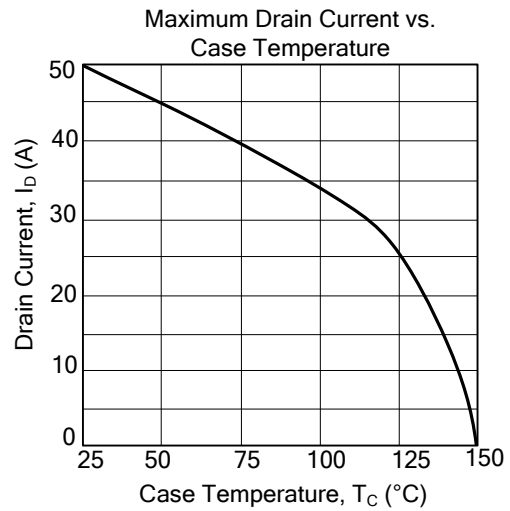
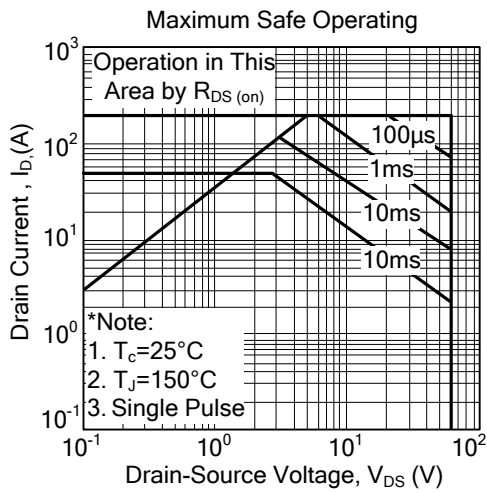
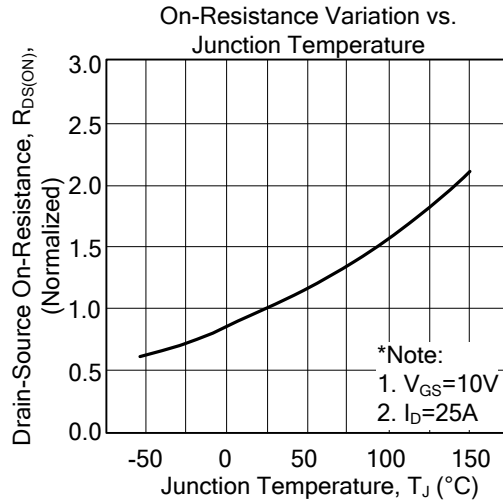
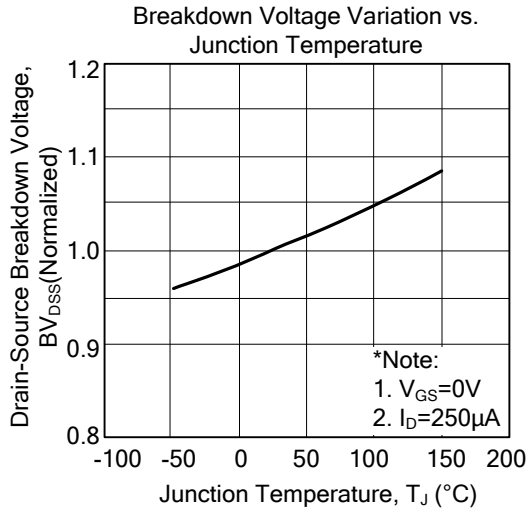


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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