

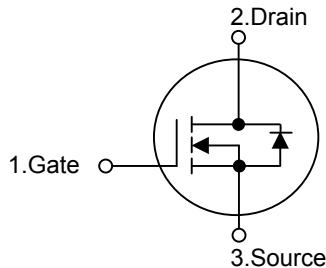
**50N06****Power MOSFET****50 Amps, 60 Volts
N-CHANNEL POWER MOSFET****DESCRIPTION**

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

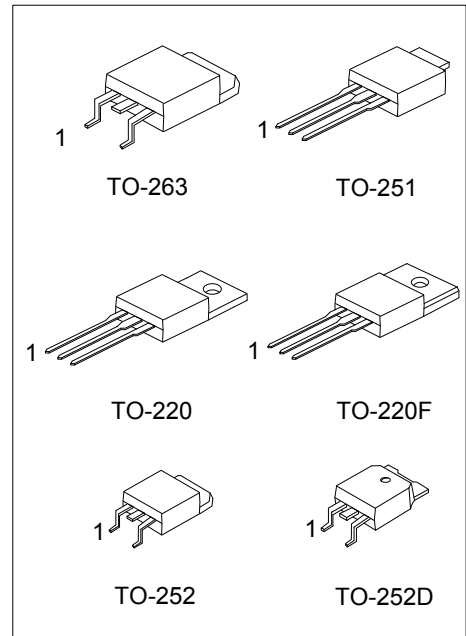
- * $R_{DS(ON)} < 23m\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 30 nC)
- * Low reverse transfer capacitance (C_{RSS} = typical 80 pF)
- * Fast switching capability
- * 100% avalanche energy specified
- * Improved dv/dt capability

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-TF3-T	50N06G-TF3-T	TO-220F	G	D	S	Tube
50N60L-TM3-T	50N60G-TM3-T	TO-251	G	D	S	Tube
50N06L-TN3-T	50N06G-TN3-T	TO-252	G	D	S	Tube
50N06L-TN3-R	50N06G-TN3-R	TO-252	G	D	S	Tape Reel
50N60L-TND-T	50N60G-TND-T	TO-252D	G	D	S	Tube
50N06L-TND-R	50N06G-TND-R	TO-252D	G	D	S	Tape Reel
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

50N06L-TA3-T (1) Packing Type (2) Package Type (3) Lead Plating	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TM3: TO-251, TN3: TO-252, TND: TO-252, TQ2: TO-263 (3) L: Lead Free, G: Halogen Free
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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	$T_C = 25^\circ\text{C}$	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/TO-263	P_D	120	W
	TO-220F		70	W
	TO-251/TO-252		46	W
	TO-252D			
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/TO-220F TO-263	θ_{JA}	62	$^\circ\text{C}/\text{W}$
	TO-251/TO-252 TO-252D		100	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.24	$^\circ\text{C}/\text{W}$
	TO-220F		1.78	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.7	$^\circ\text{C}/\text{W}$
	TO-252D			
	TO-263		1.24	$^\circ\text{C}/\text{W}$

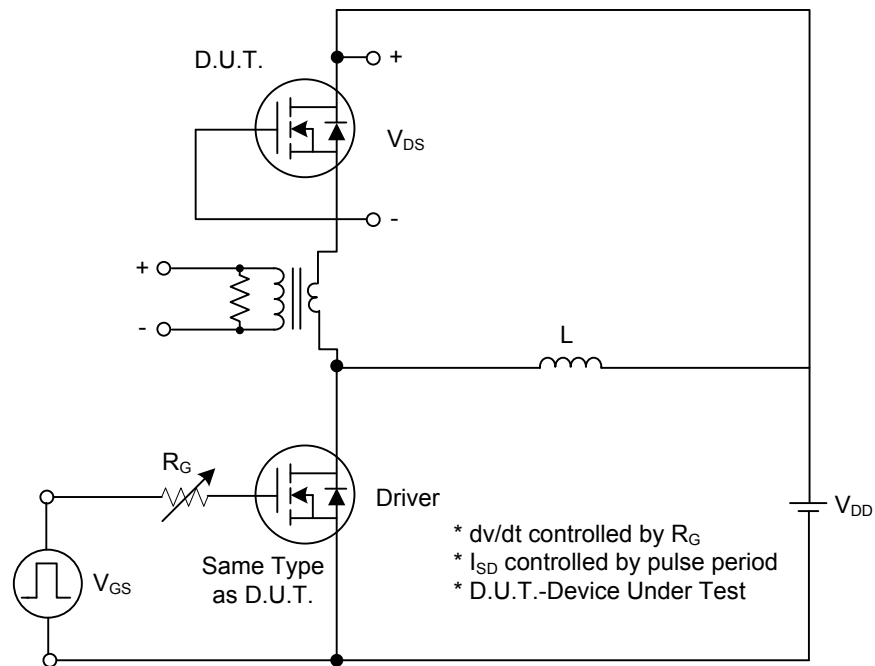
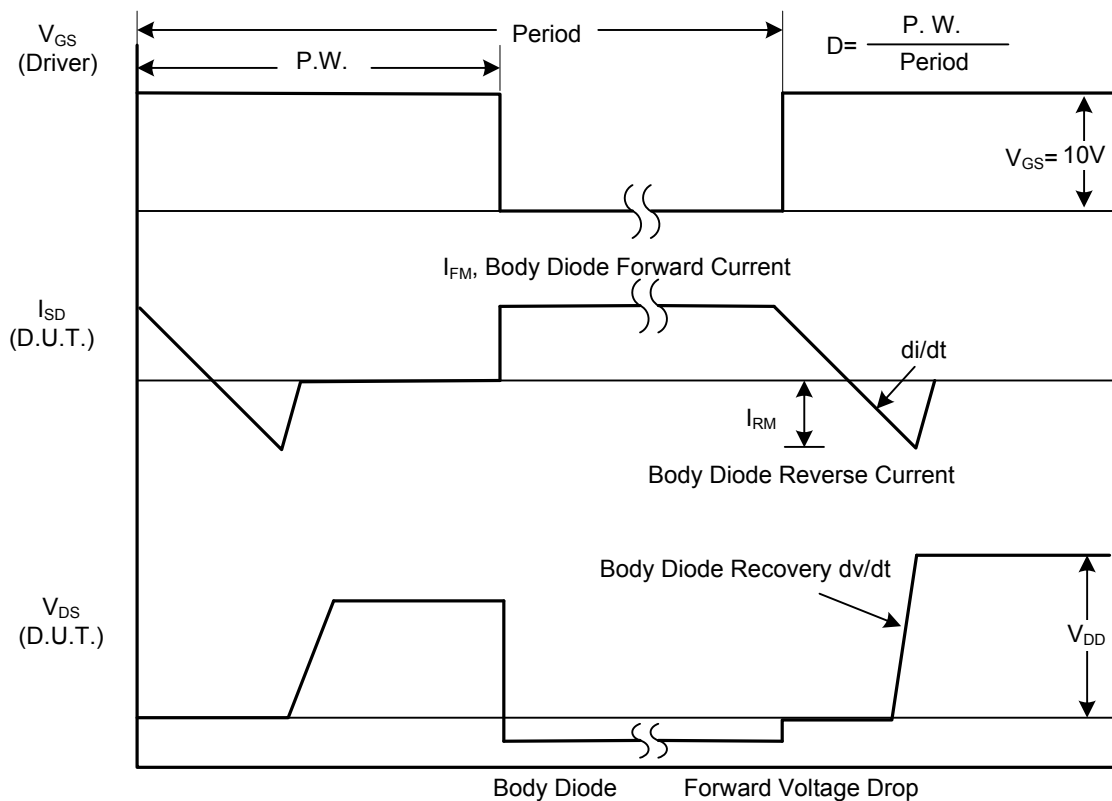
■ **ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$, unless otherwise specified)

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}	V _{GS} = 20V, V _{DS} = 0 V			100	nA
	Reverse		V _{GS} = -20V, V _{DS} = 0 V			-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							
Turn-On Delay Time		t _{D(ON)}	V _{DD} = 30V, I _D =25 A, R _G = 50Ω (Note 1, 2)		40	60	ns
Turn-On Rise Time		t _R			100	200	ns
Turn-Off Delay Time		t _{D(OFF)}			90	180	ns
Turn-Off Fall Time		t _F			80	160	ns
Total Gate Charge		Q _G	V _{DS} = 48V, V _{GS} = 10 V I _D = 50A (Note 1, 2)		30	40	nC
Gate-Source Charge		Q _{GS}			9.6		nC
Gate-Drain Charge		Q _{GD}			10		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V _{SD}	I _S = 50A, V _{GS} = 0 V			1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I _S				50	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				200	A
Reverse Recovery Time		t _{RR}	I _S = 50A, V _{GS} = 0 V		54		ns
Reverse Recovery Charge		Q _{RR}	dI _F / dt = 100 A/μs		81		μC

Notes: 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

Fig. 1A Peak Diode Recovery dv/dt Test CircuitFig. 1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

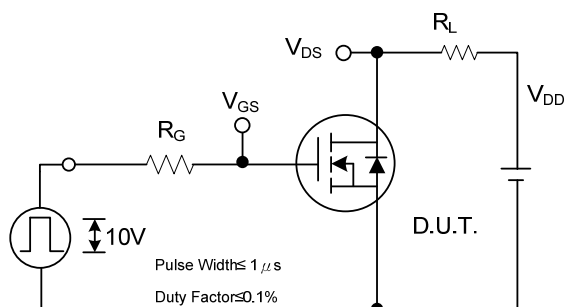


Fig. 2A Switching Test Circuit

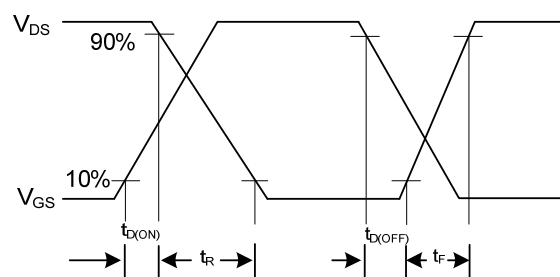


Fig. 2B Switching Waveforms

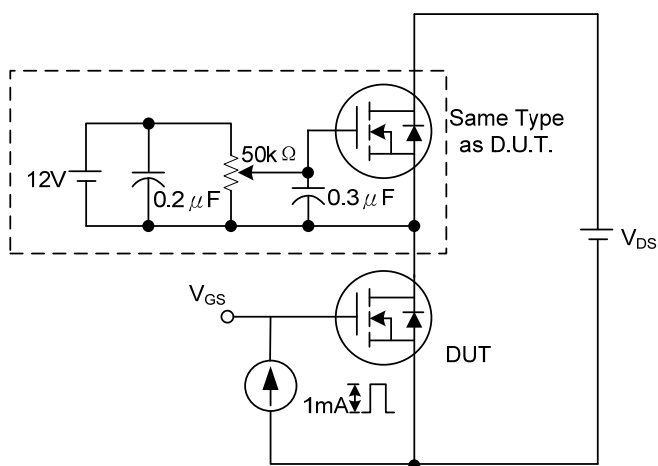


Fig. 3A Gate Charge Test Circuit

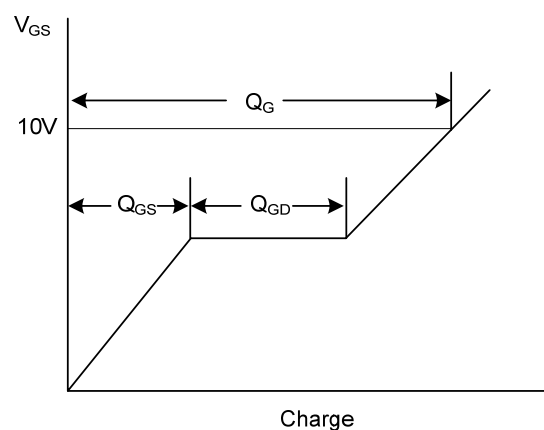


Fig. 3B Gate Charge Waveform

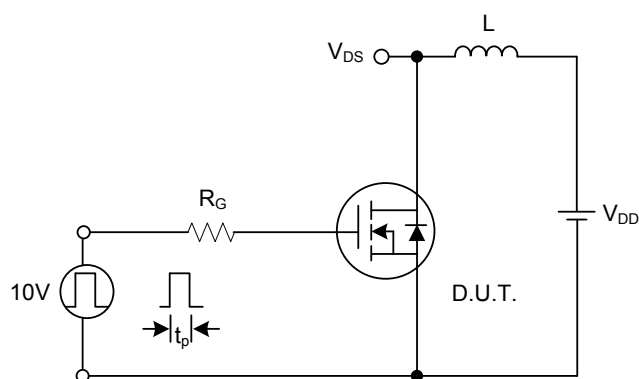


Fig. 4A Unclamped Inductive Switching Test Circuit

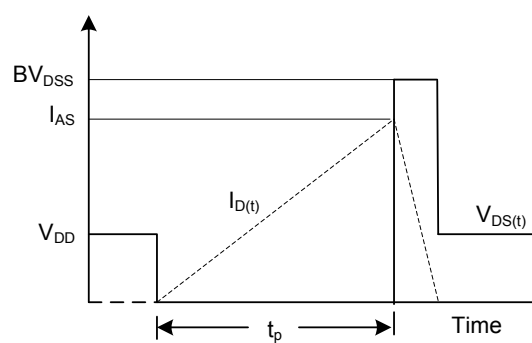
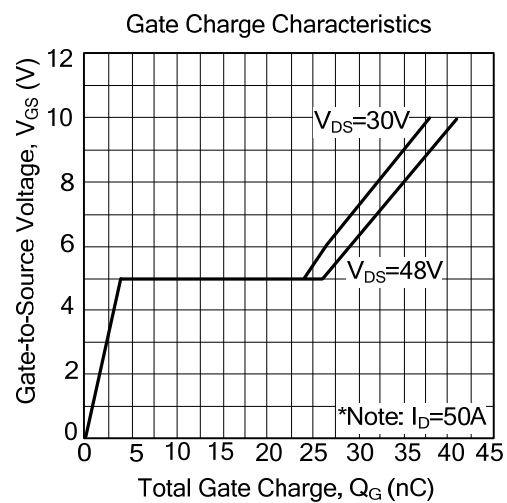
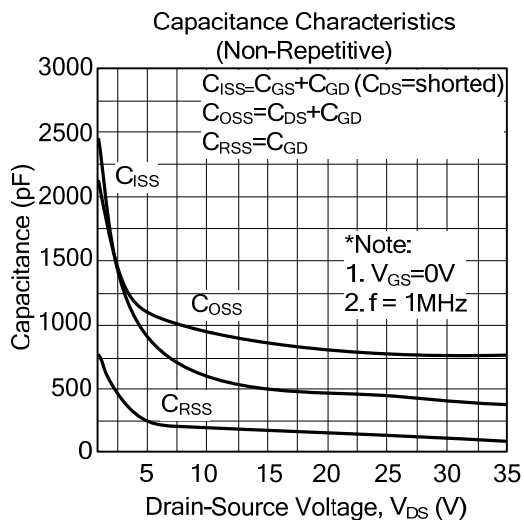
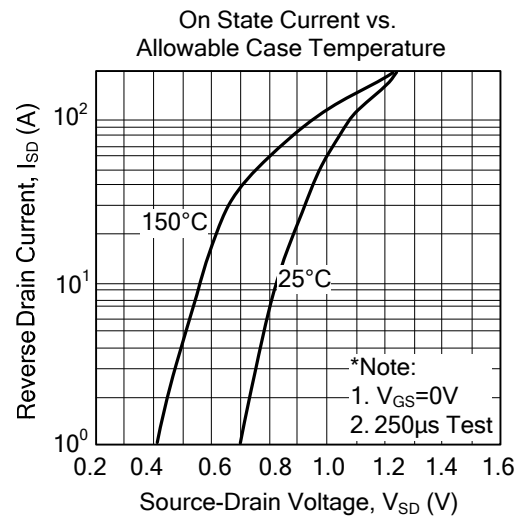
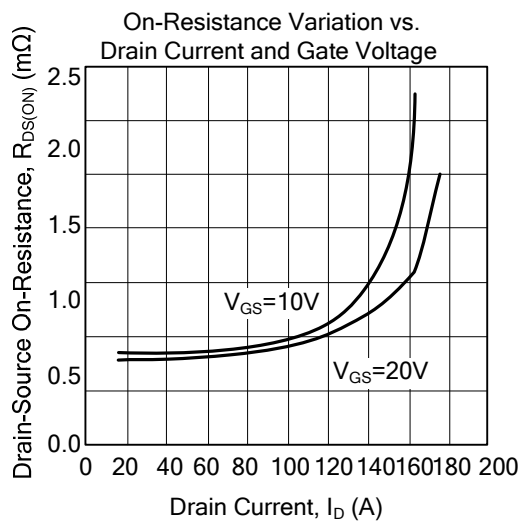
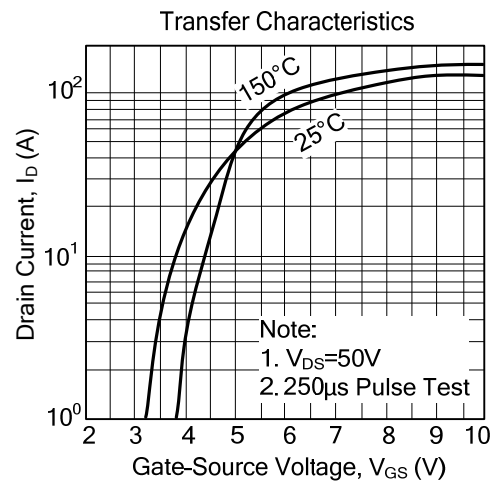
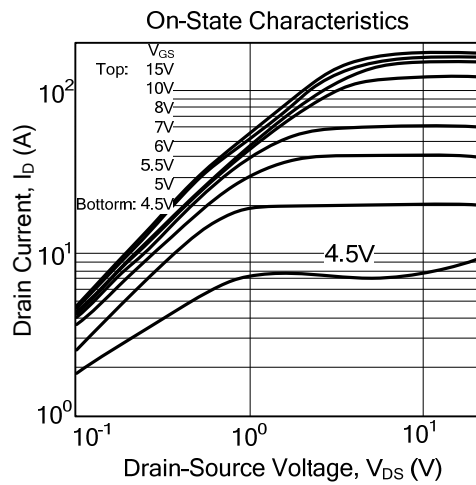
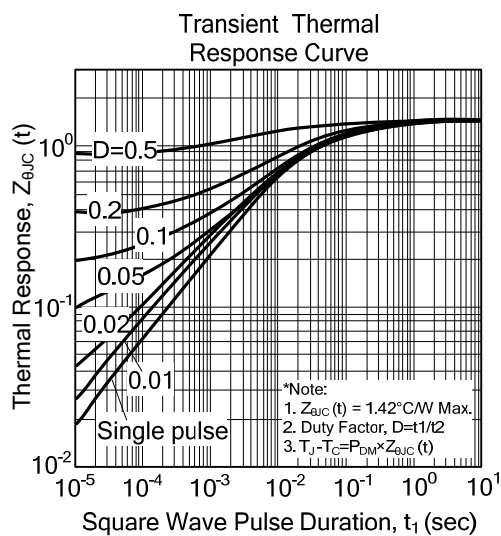
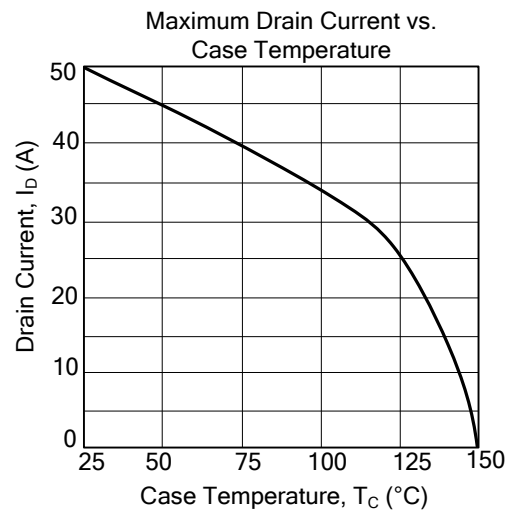
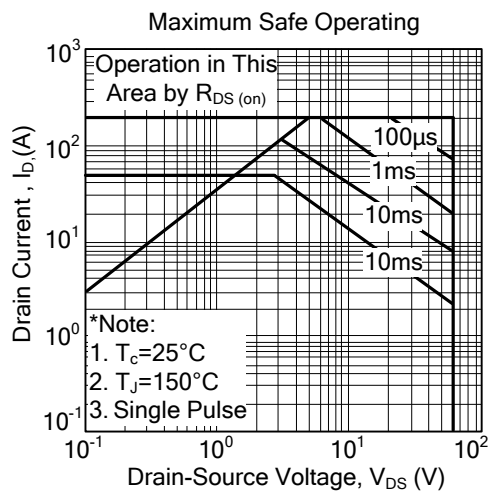
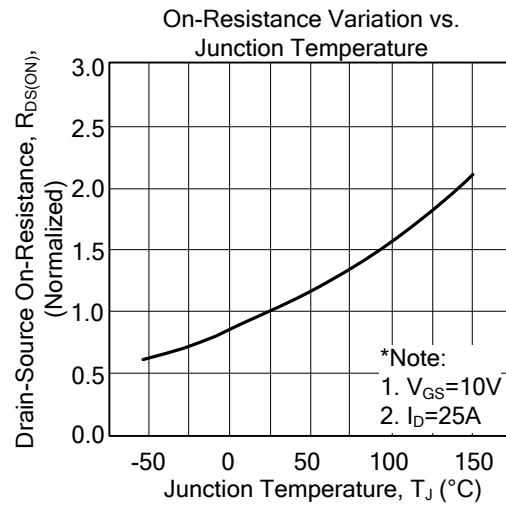
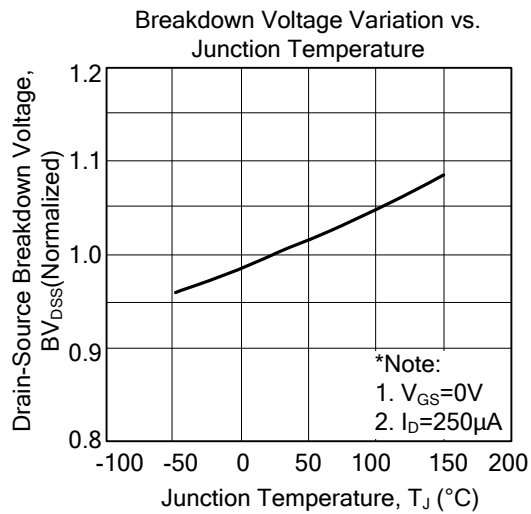


Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS(Cont.)



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