



8N60

Power MOSFET

8A, 600V N-CHANNEL POWER MOSFET

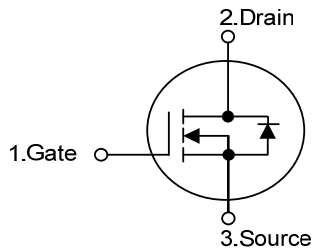
■ DESCRIPTION

The UTC **8N60** is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

- * $R_{DS(ON)} = 1.2\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 28 nC)
- * Low reverse transfer capacitance ($C_{RSS} =$ typical 12.0 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

■ SYMBOL

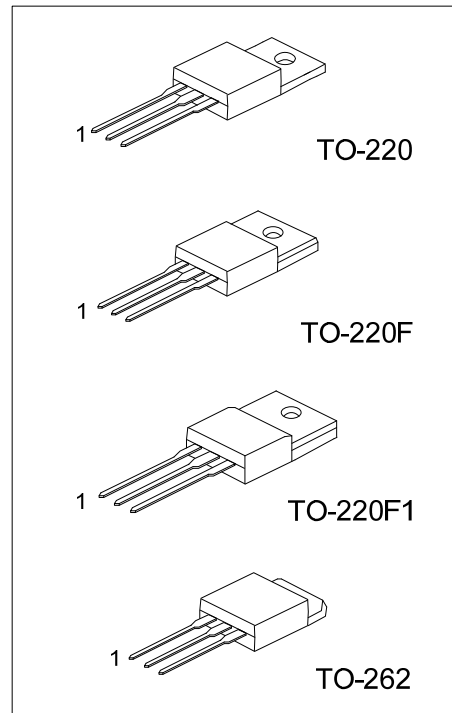


■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
8N60L-TA3-T	8N60G-TA3-T	TO-220	G	D	S	Tube
8N60L-TF1-T	8N60G-TF1-T	TO-220F1	G	D	S	Tube
8N60L-TF3-T	8N60G-TF3-T	TO-220F	G	D	S	Tube
8N60L-T2Q-T	8N60G-T2Q-T	TO-262	G	D	S	Tube

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

<p>8N60L-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube (2) TA3: TO-220, TF1: TO220-F1, TF3: TO-220F T2Q: TO-262 (3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	8	A
Drain Current	Continuous	I_D	8	A
	Pulsed (Note 2)	I_{DM}	32	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	230	mJ
	Repetitive (Note 2)	E_{AR}	14.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220/TO-262	P_D	147	W
	TO-220F/TO-220F1		48	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
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. $L = 7.1\text{mH}$, $I_{AS} = 8\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7.5\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

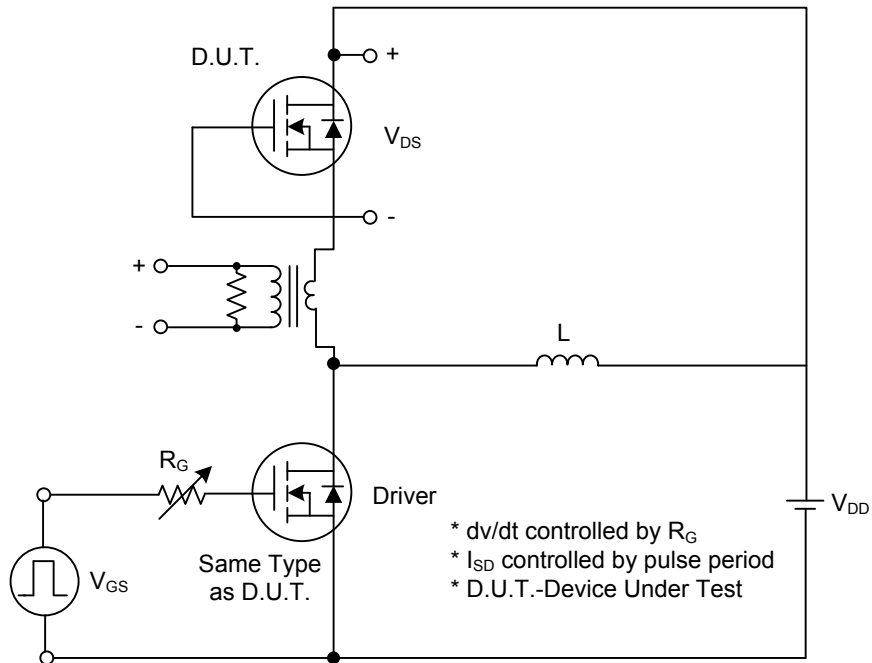
PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient		θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-262	θ_{JC}	0.85	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.6	$^\circ\text{C}/\text{W}$

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

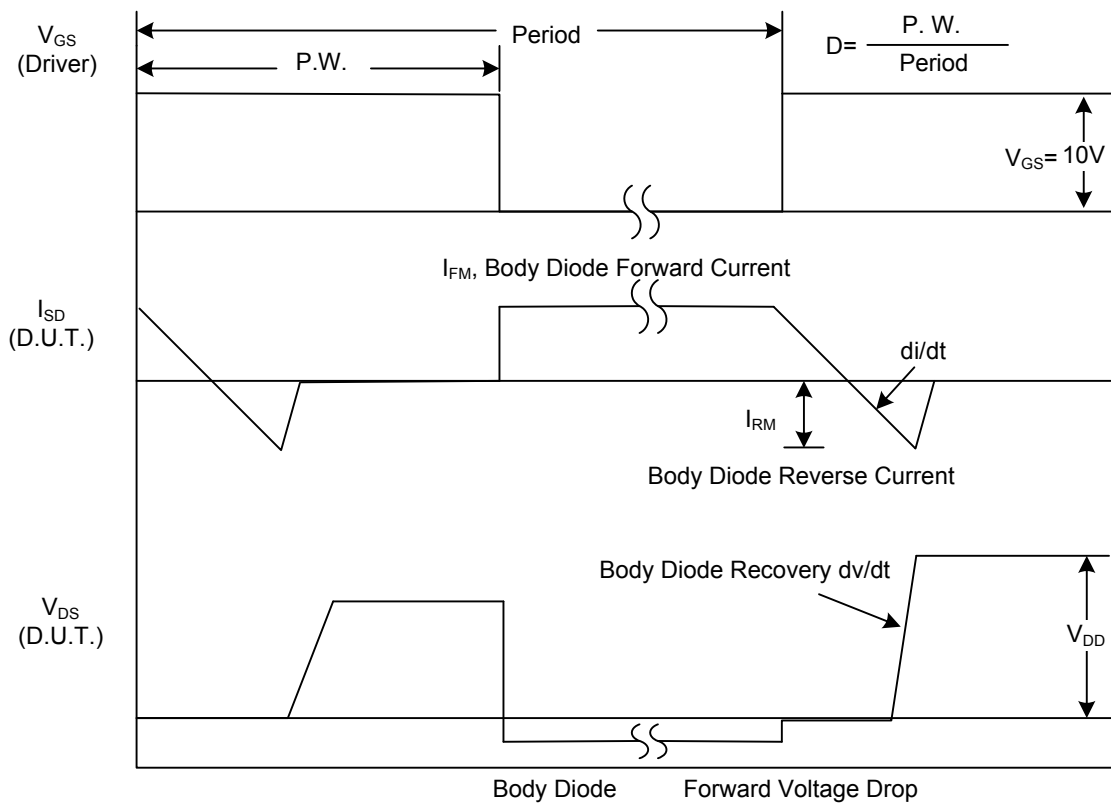
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	600			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	-100
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$, Referenced to 25°C		0.7		$\text{V}/^\circ\text{C}$
ON CHARACTERISTICS						
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	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 4\text{ A}$		1.0	1.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		965	1255	pF
Output Capacitance	C_{OSS}		105	135	pF	
Reverse Transfer Capacitance	C_{RSS}		12	16	pF	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = 300\text{ V}, I_D = 8\text{ A},$ $R_G = 25\Omega$ (Note 1, 2)		16.5	45	ns
Turn-On Rise Time	t_R		60.5	130	ns	
Turn-Off Delay Time	$t_{D(OFF)}$		81	170	ns	
Turn-Off Fall Time	t_F		64.5	140	ns	
Total Gate Charge	Q_G	$V_{DS} = 480\text{ V}, I_D = 8\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 1, 2)		28	36	nC
Gate-Source Charge	Q_{GS}		4.5		nC	
Gate-Drain Charge	Q_{GD}		12		nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 8\text{ A}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				8	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				32	A
Reverse Recovery Time	t_{rr}	$V_{GS} = 0\text{ V}, I_S = 8\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 2)		365		ns
Reverse Recovery Charge	Q_{RR}		3.4		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

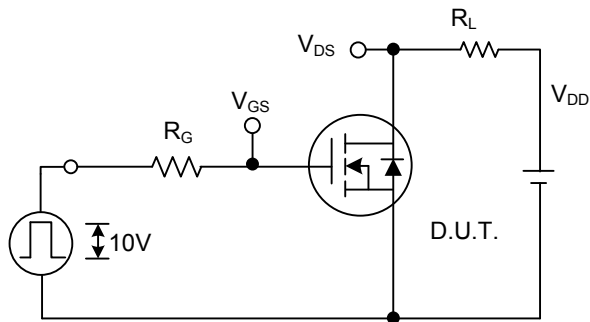


Peak Diode Recovery dv/dt Test Circuit

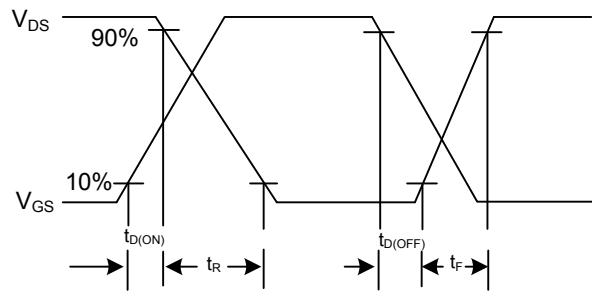


Peak Diode Recovery dv/dt Waveforms

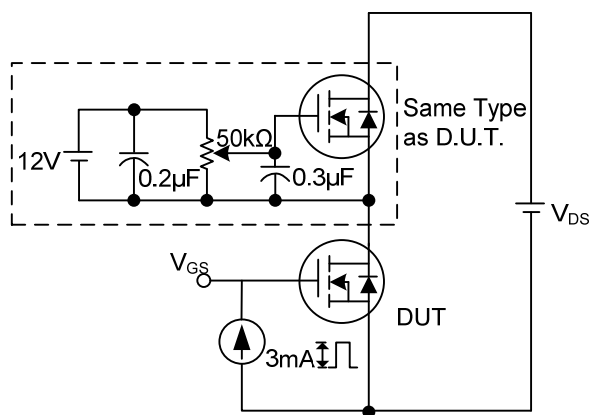
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



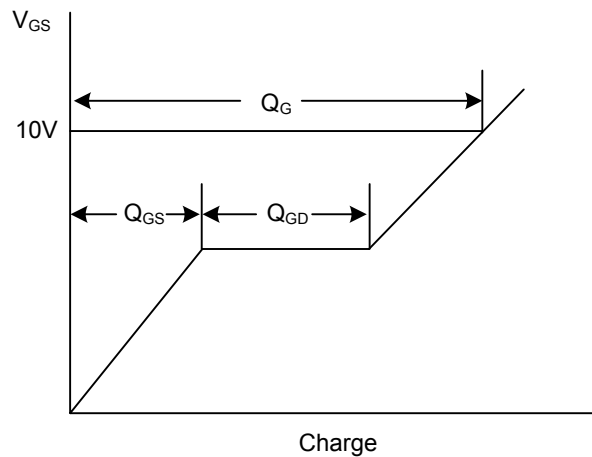
Switching Test Circuit



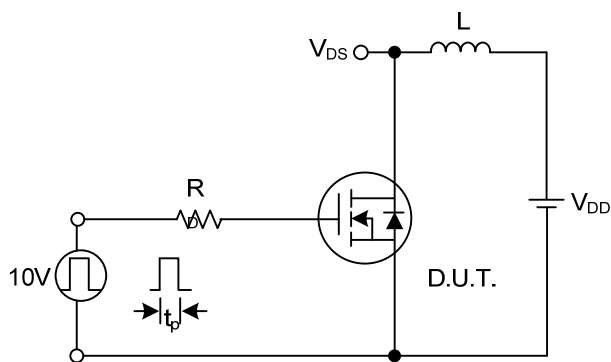
Switching Waveforms



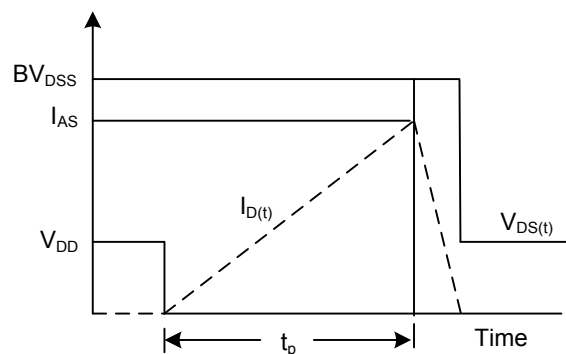
Gate Charge Test Circuit



Gate Charge Waveform

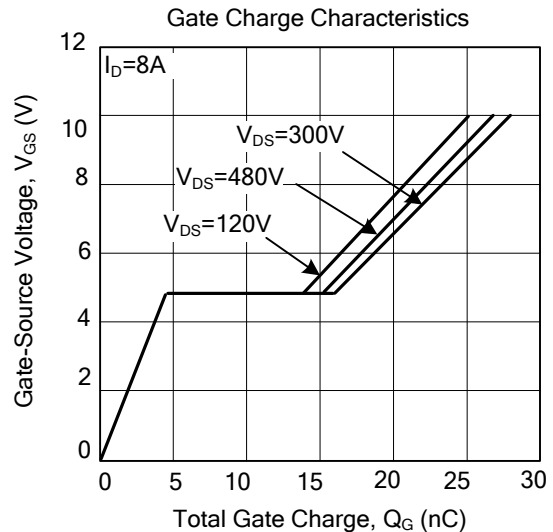
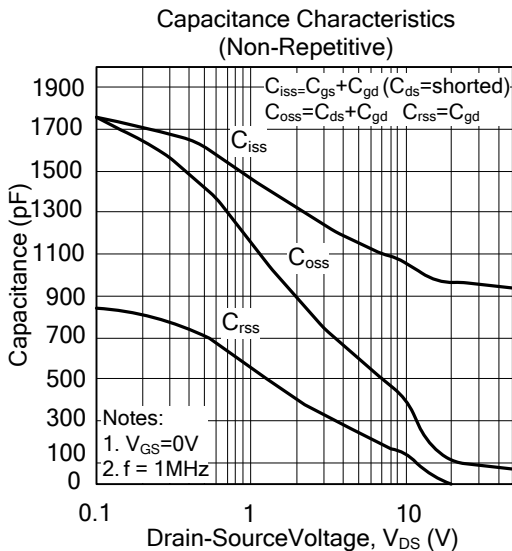
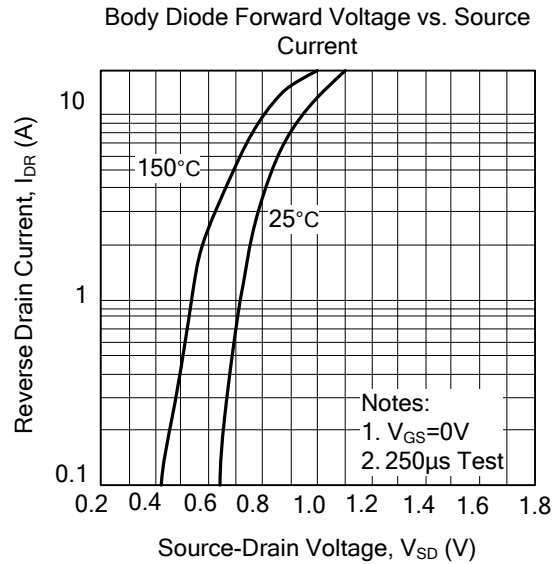
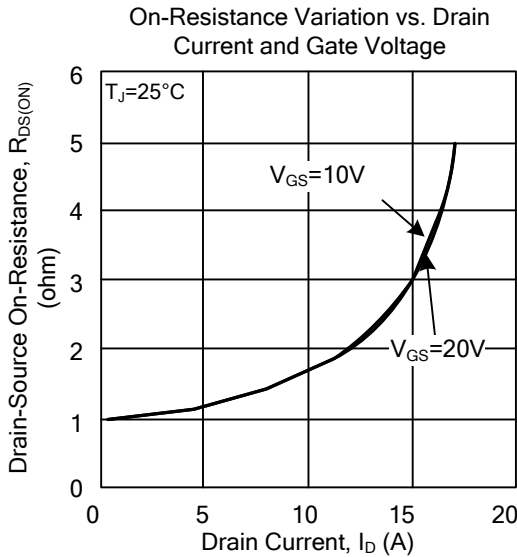
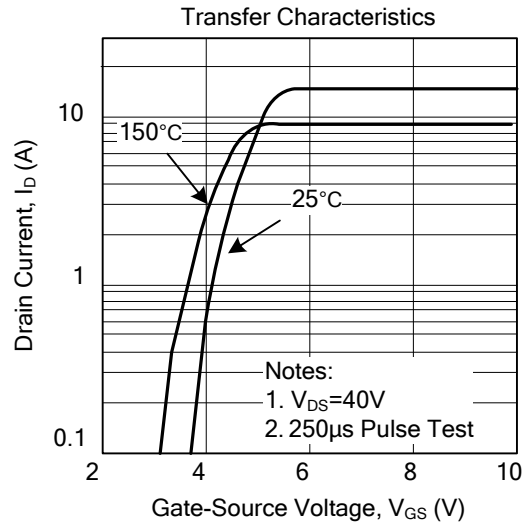
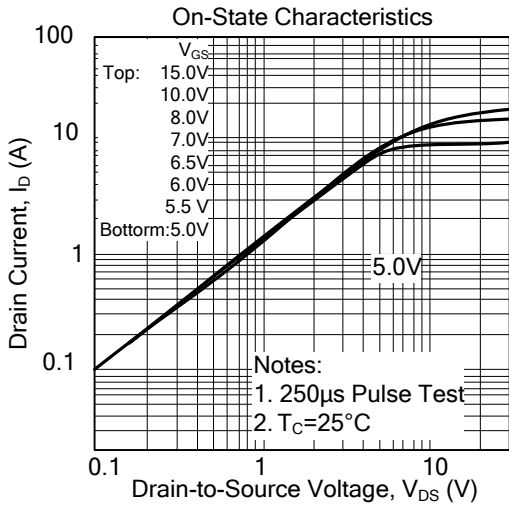


Unclamped Inductive Switching Test Circuit

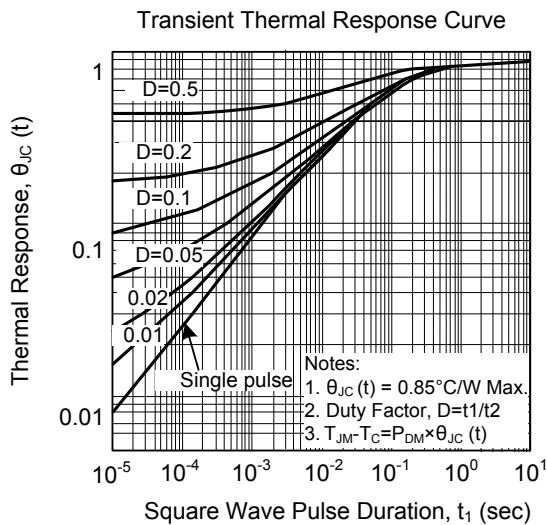
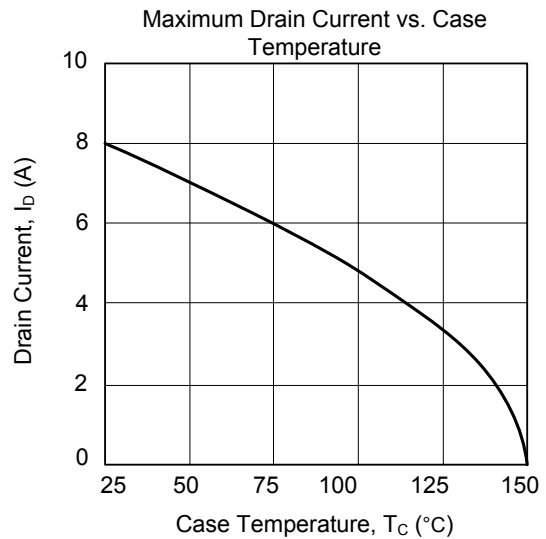
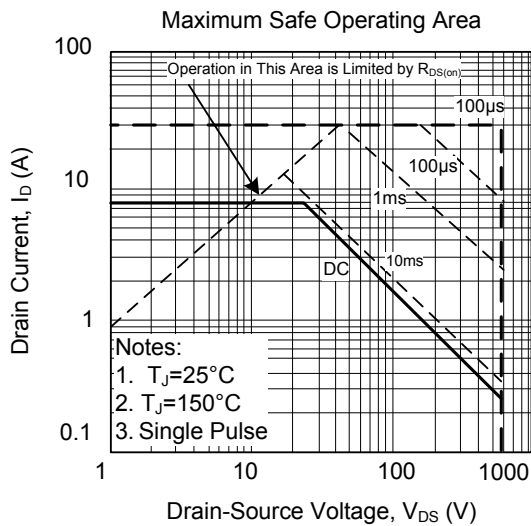
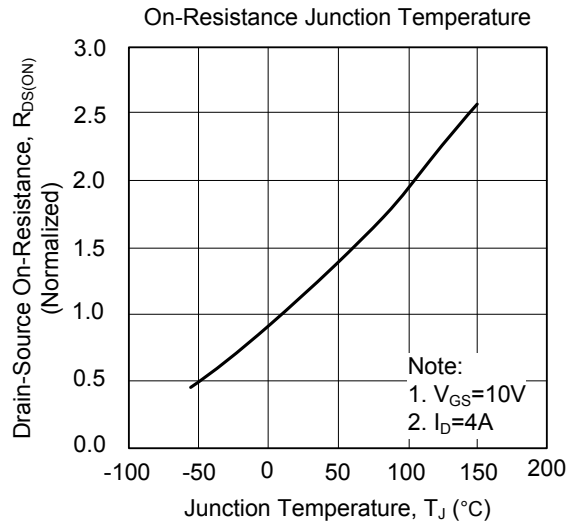
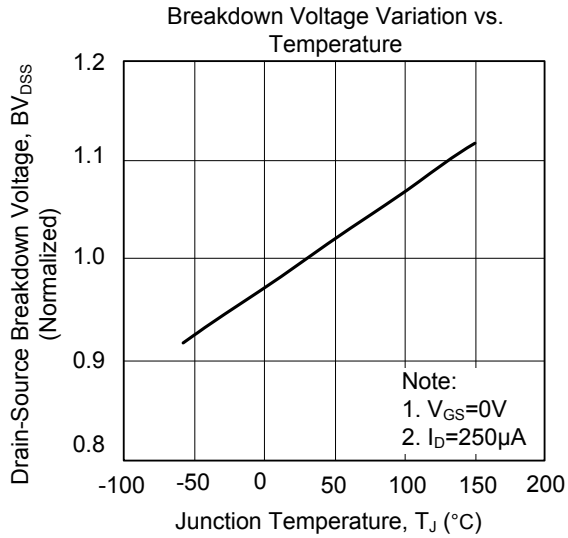


Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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