



60N06

Power MOSFET

60A, 60V N-CHANNEL POWER MOSFET

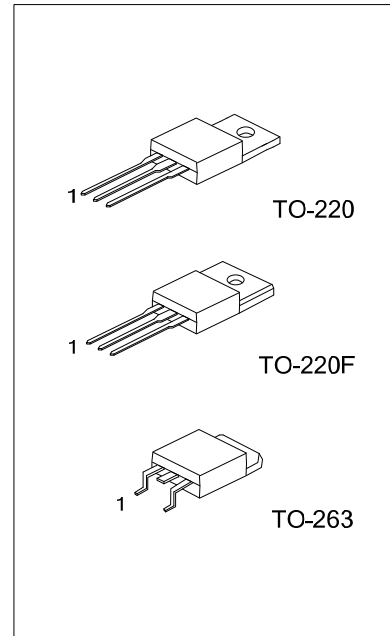
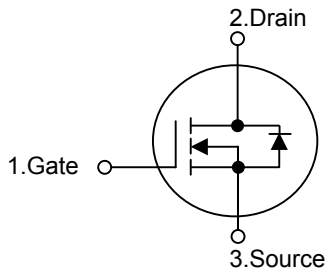
DESCRIPTION

The UTC **60N06** is N-channel enhancement mode power field effect transistors with stable off-state characteristics, fast switching speed, low thermal resistance, usually used at telecom and computer application.

FEATURES

- * $R_{DS(ON)} = 18m\Omega @ V_{GS} = 10V$
- * Ultra low gate charge (typical 39nC)
- * Fast switching capability
- * Low reverse transfer Capacitance ($C_{RSS} =$ typical 115pF)
- * 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	
60N06L-TA3-T	60N06G-TA3-T	TO-220	G	D	S	Tube
60N06L-TF3-T	60N06G-TF3-T	TO-220F	G	D	S	Tube
60N06L-TQ2-R	60N06G-TQ2-R	TO-263	G	D	S	Tape Reel
60N06L-TQ2-T	60N06G-TQ2-T	TO-263	G	D	S	Tube

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

<p>60N06L-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube (2) TA3: TO-220, TF3: TO-220F, TQ2: TO-263 (3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage		V_{DSS}	60	V
Gate to Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	60	A
	$T_C = 100^\circ\text{C}$		39	A
Drain Current Pulsed (Note 2)		I_{DM}	120	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1000	mJ
	Repetitive (Note 2)	E_{AR}	180	mJ
Power Dissipation ($T_C=25^\circ\text{C}$)	TO-220	P_D	100	W
	TO-220F		70.62	
	TO-263		54	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: 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. Repeatability rating: pulse width limited by junction temperature

3. $L=0.61\text{mH}$, $I_{AS}=60\text{A}$, $R_G=20\Omega$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-263		110	
Junction to Case	TO-220	θ_{JC}	1.25	$^\circ\text{C/W}$
	TO-220F		1.77	
	TO-263		2.31	

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

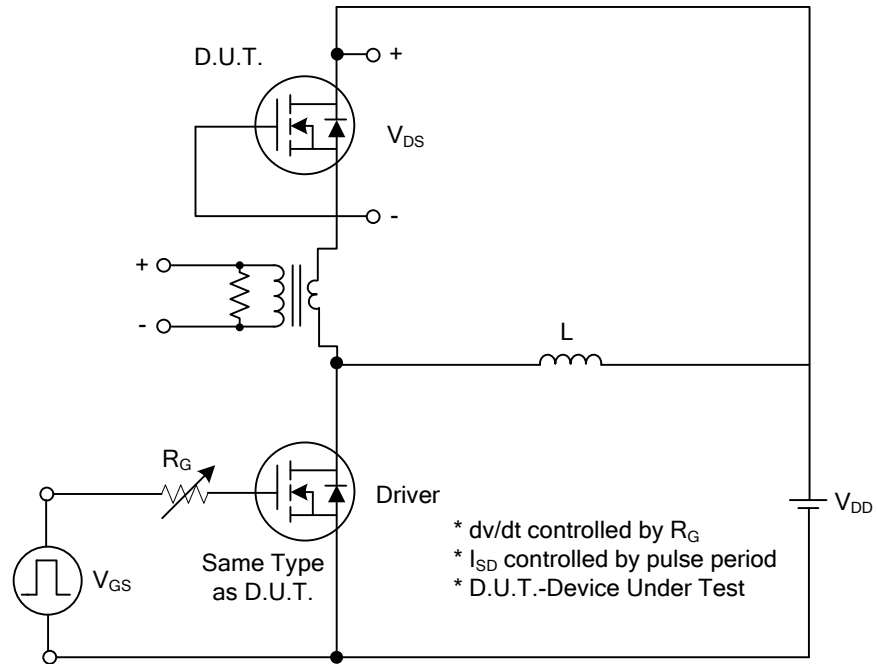
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}$, $I_D = 250\mu\text{A}$	60			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	nA
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	$R_{DS(ON)}$	$V_{GS} = 10\text{ V}$, $I_D = 30\text{A}$		14	18	m Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		2000		pF
Output Capacitance	C_{OSS}			400		pF
Reverse Transfer Capacitance	C_{RSS}			115		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=30\text{ V}$, $I_D=60\text{ A}$, $R_L=0.5\Omega$, $V_{GS}=10\text{ V}$ (Note 2, 3)		12	30	ns
Rise Time	t_R			11	30	ns
Turn-Off Delay Time	$t_{D(OFF)}$			25	50	ns
Fall Time	t_F			15	30	ns
Total Gate Charge	Q_G	$V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$ $I_D = 60\text{ A}$ (Note 2, 3)		39	60	nC
Gate-Source Charge	Q_{GS}			12		nC
Gate-Drain Charge (Miller Charge)	Q_{GD}			10		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

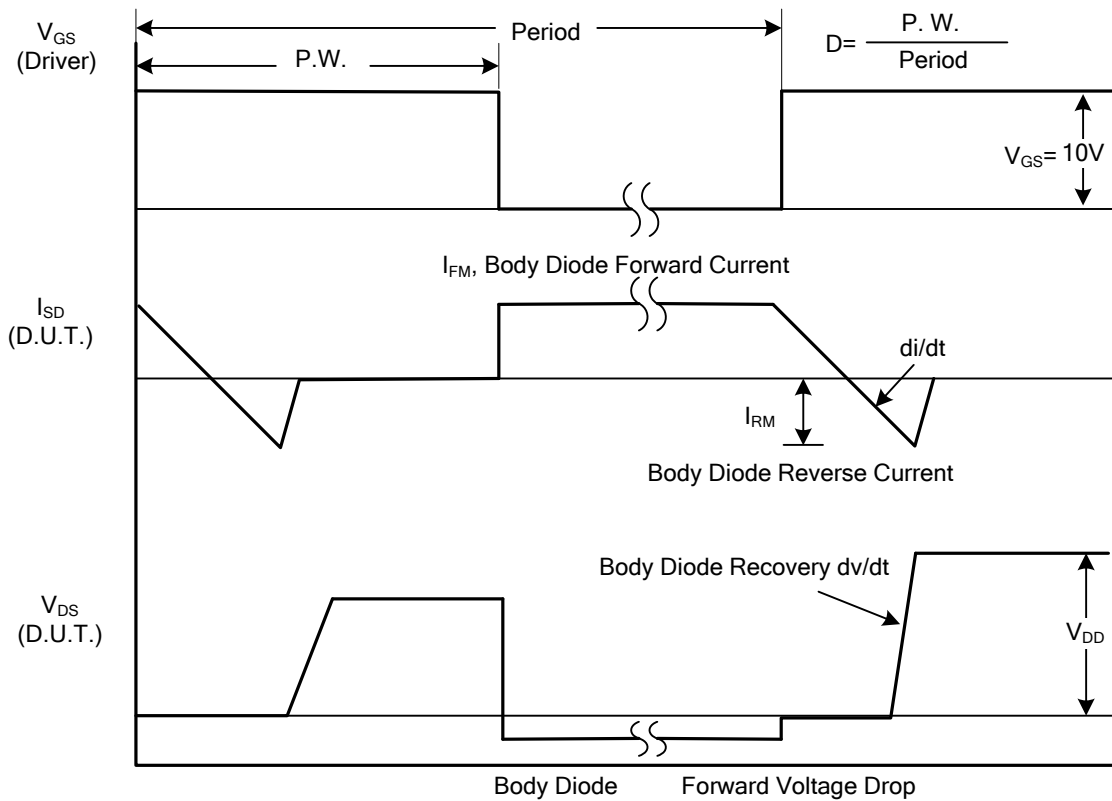
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 60\text{ A}$			1.6	V
Continuous Source Current	I_S				60	A
Pulsed Source Current	I_{SM}				120	
Reverse Recovery Time	t_{rr}	$I_S=60\text{ A}, V_{GS}=0\text{ V}, di_F/dt=100\text{ A}/\mu\text{s}$		60		ns
Reverse Recovery Charge	Q_{RR}			3.4		μC

- Note: 1. $I_{SD} \leq 60\text{ A}$, $di/dt \leq 300\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
 2. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
 3. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

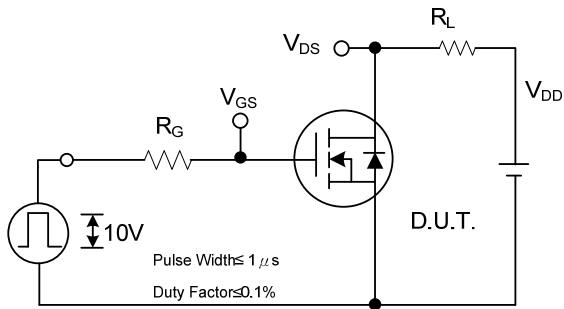


Peak Diode Recovery dv/dt Test Circuit

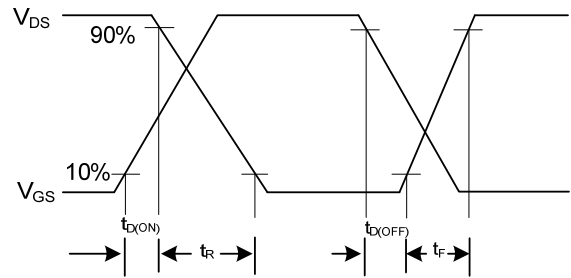


Peak Diode Recovery dv/dt Waveforms

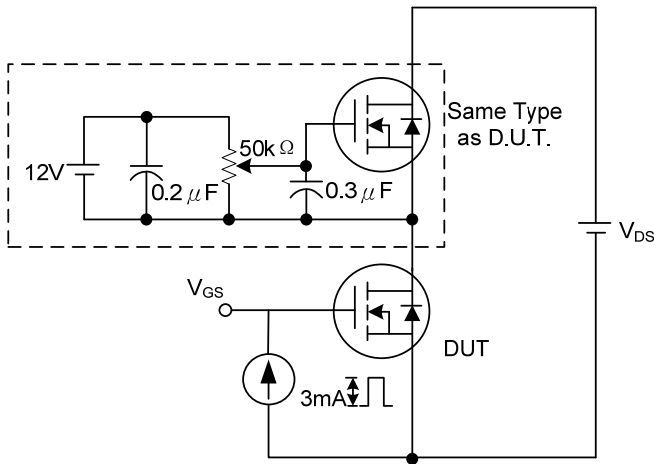
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



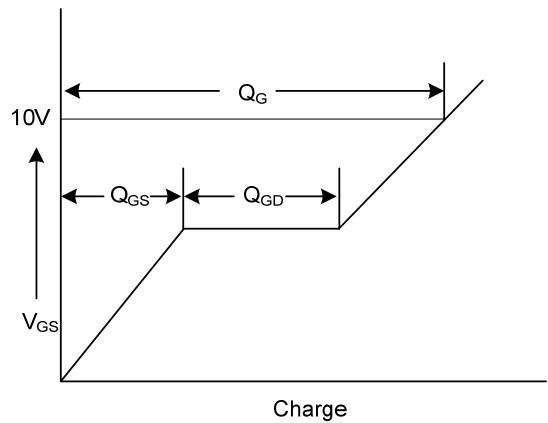
Switching Test Circuit



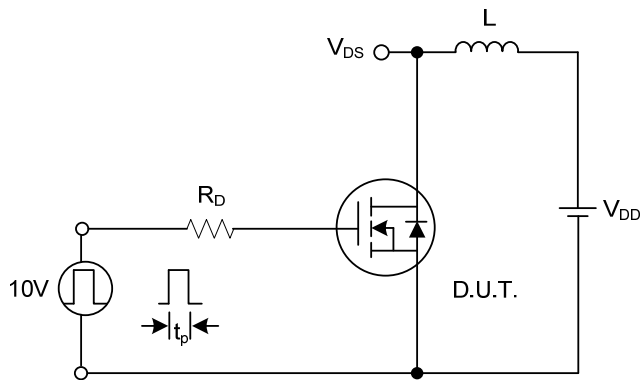
Switching Waveforms



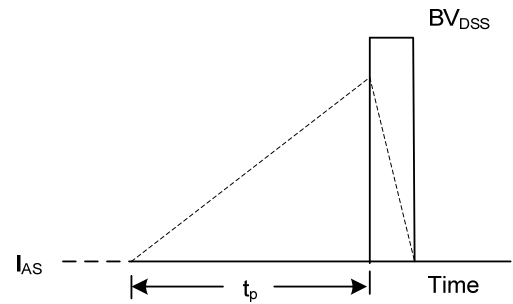
Gate Charge Test Circuit



Gate Charge Waveform

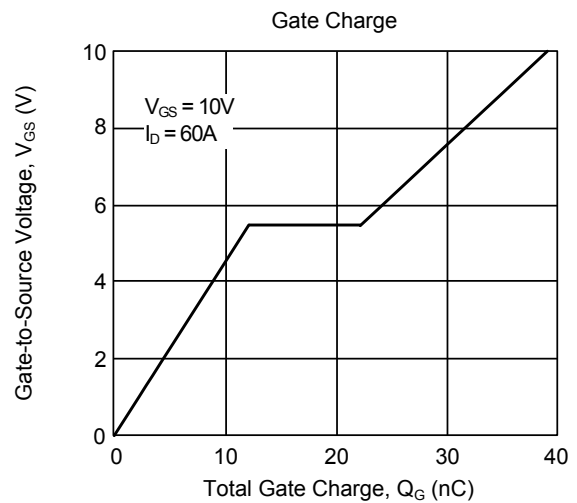
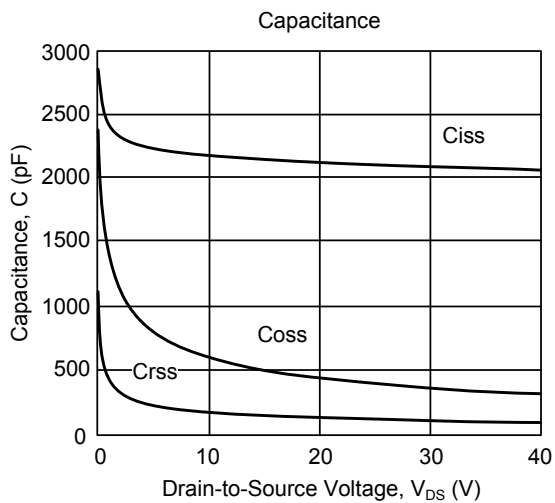
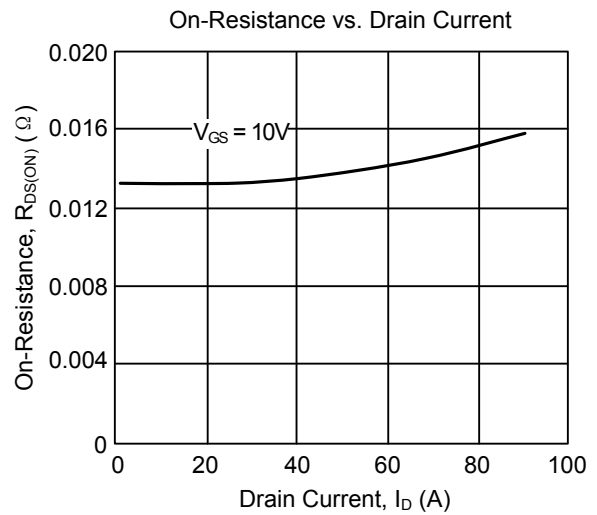
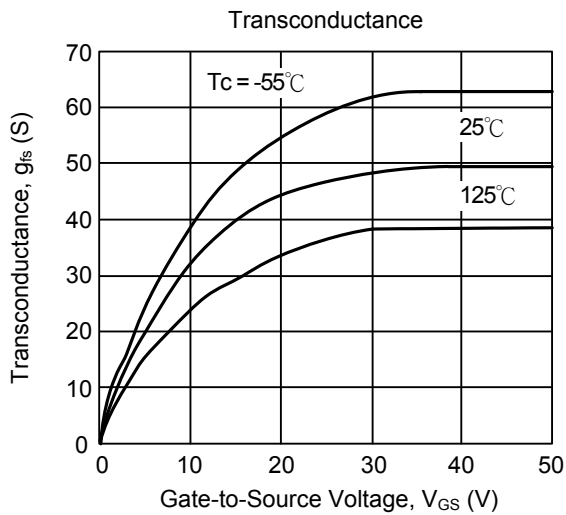
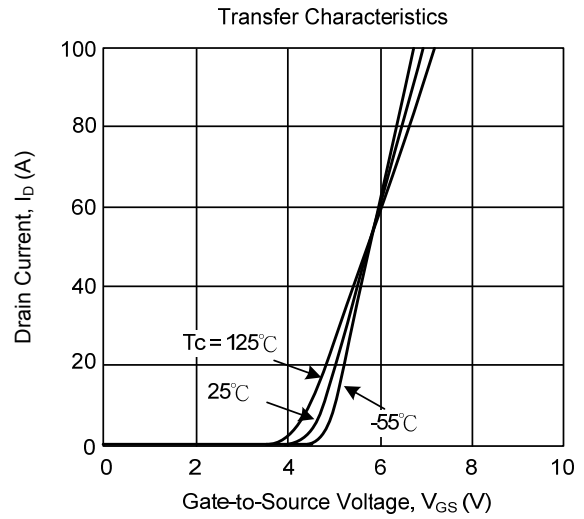
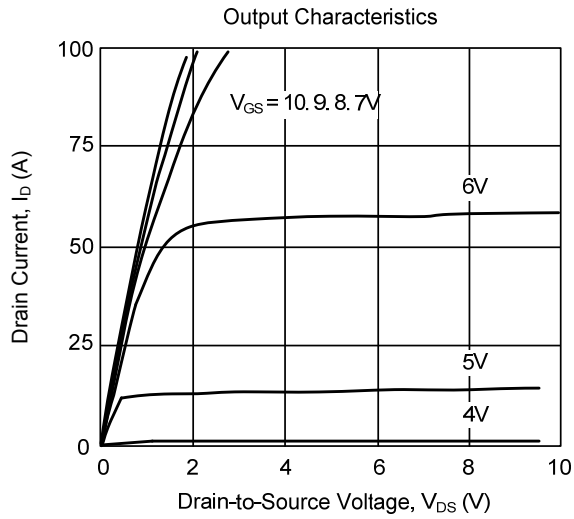


Unclamped Inductive Switching Test Circuit

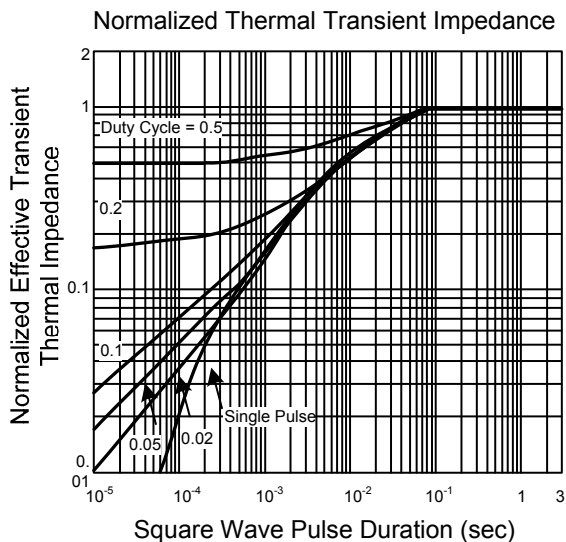
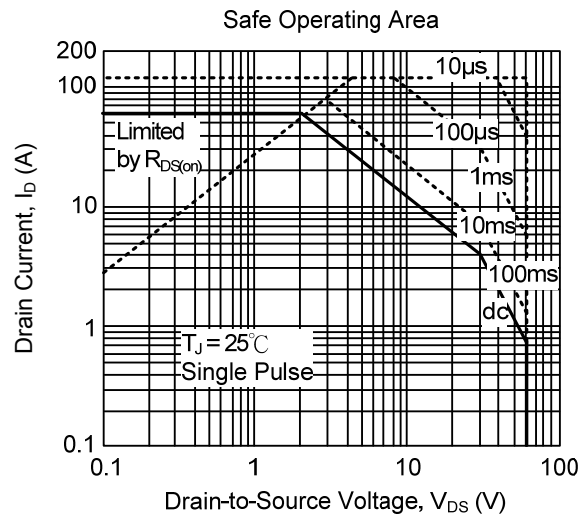
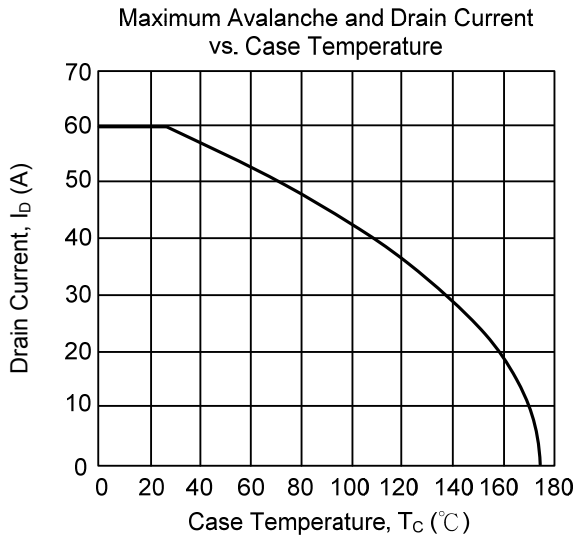
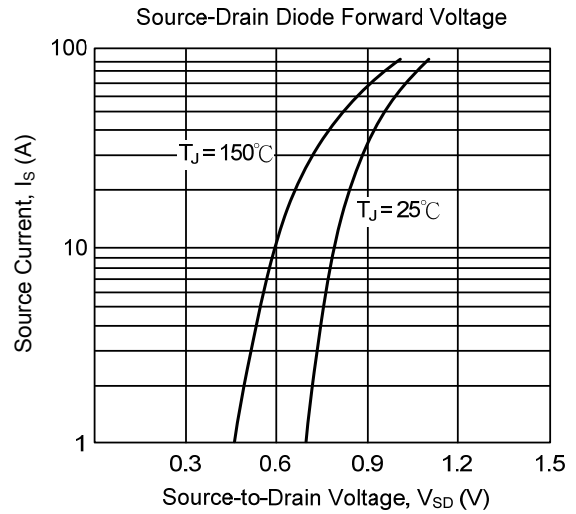
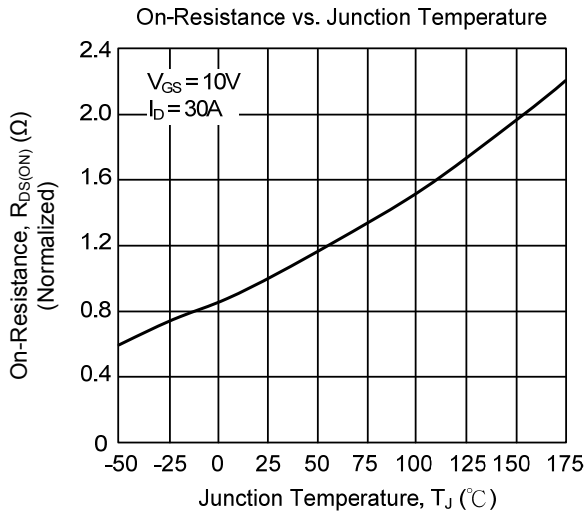


Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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