



# UT9971

**Power MOSFET**

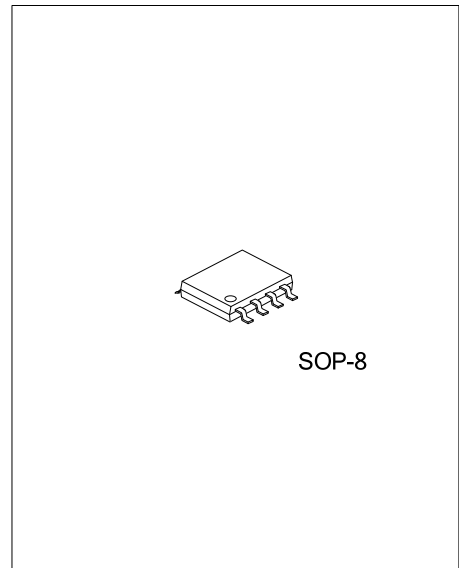
## 5A, 60V N-CHANNEL POWER MOSFET

### DESCRIPTION

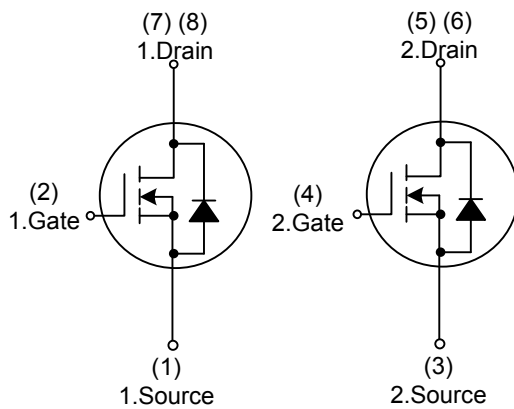
The UTC **UT9971** uses UTC's advanced technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for being used as a load switch or in PWM applications.

### FEATURES

- \*  $R_{DS(ON)} \leq 63 \text{ m}\Omega$  @  $V_{GS}=10\text{V}$ ,  $I_D=5.0\text{A}$
- \*  $R_{DS(ON)} \leq 86 \text{ m}\Omega$  @  $V_{GS}=4.5\text{V}$ ,  $I_D=2.5\text{A}$
- \* Ultra low gate charge ( typical 16 nC )
- \* Fast switching capability
- \* Avalanche energy Specified
- \* Improved dv/dt capability, high ruggedness



### SYMBOL



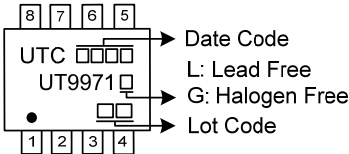
### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT9971L-S08-R	UT9971G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

<p>UT9971G-S08-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) S08: SOP-8</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	60	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Continuous Drain Current ( $V_{GS}=10\text{V}$ )	$I_D$	5	A
Pulsed Drain Current (Note 2,3)	$I_{DM}$	30	A
Power Dissipation	$P_D$	1.6	W
Junction Temperature	$T_J$	+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 maximum junction temperature.

3.  $L=0.1\text{mH}$ ,  $I_{AS}=16.1\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

4.  $I_{SD} \leq 5.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^{\circ}\text{C}/\text{W}$

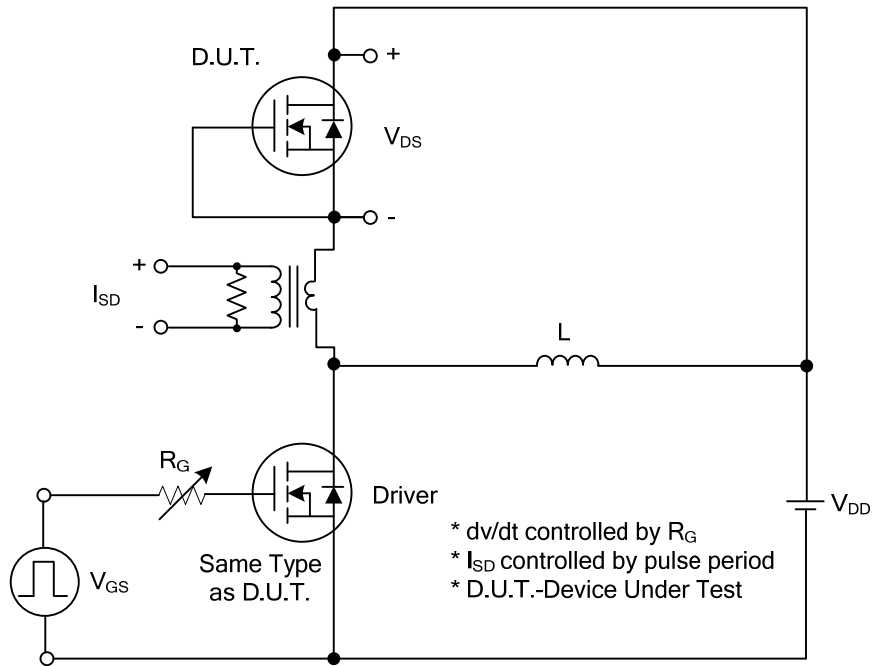
■ ELECTRICAL CHARACTERISTICS ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{V}$ , $I_D=250\mu\text{A}$	60			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60\text{V}$ , $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.0		3.0	V
Static Drain-Source On-Resistance (Note)	$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=5.0\text{A}$			63	m $\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=2.5\text{A}$			86	
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25\text{V}$ , $V_{GS}=0\text{V}$ , $f=1.0\text{MHz}$		620		pF
Output Capacitance	$C_{OSS}$			48		pF
Reverse Transfer Capacitance	$C_{RSS}$			36		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note)	$Q_G$	$V_{DS}=48\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=5\text{A}$ $I_G=1\text{mA}$ (Note 1, 2)		16		nC
Gate Source Charge	$Q_{GS}$			2.5		nC
Gate Drain Charge	$Q_{GD}$			2.4		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{DD}=30\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=8\text{A}$ , $R_G=3.3\Omega$ (Note 1, 2)		4		ns
Turn-ON Rise Time	$t_R$			15		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			17		ns
Turn-OFF Fall-Time	$t_F$			18		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				5	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				30	A
Diode Forward Voltage (Note)	$V_{SD}$	$I_S=5.0\text{A}$ , $V_{GS}=0\text{V}$			1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_S=5.0\text{A}$ , $V_{GS}=0\text{V}$ ,		40		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$di/dt=100\text{A}/\mu\text{s}$		45		nC

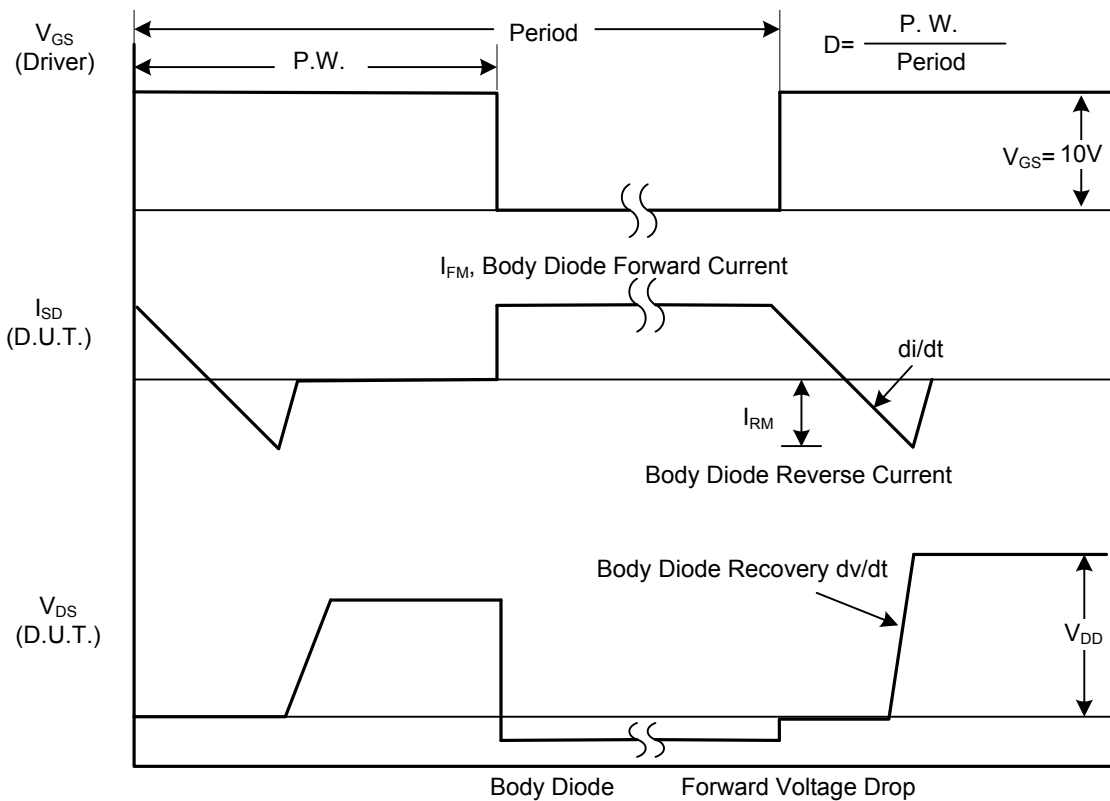
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

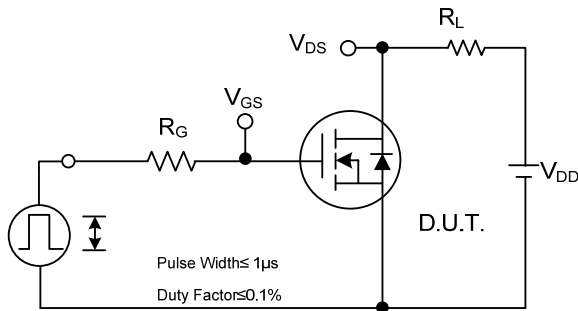


Peak Diode Recovery  $dv/dt$  Test Circuit

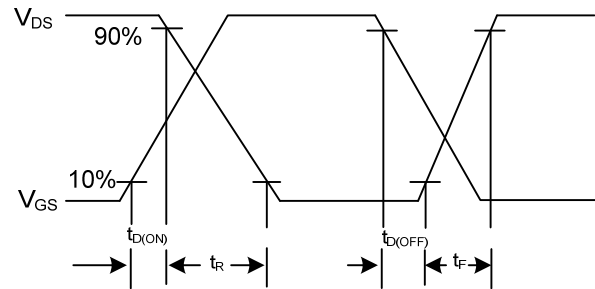


Peak Diode Recovery  $dv/dt$  Waveforms

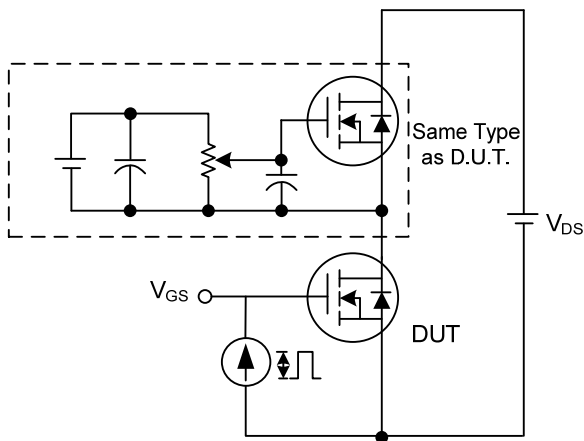
■ TEST CIRCUITS AND WAVEFORMS



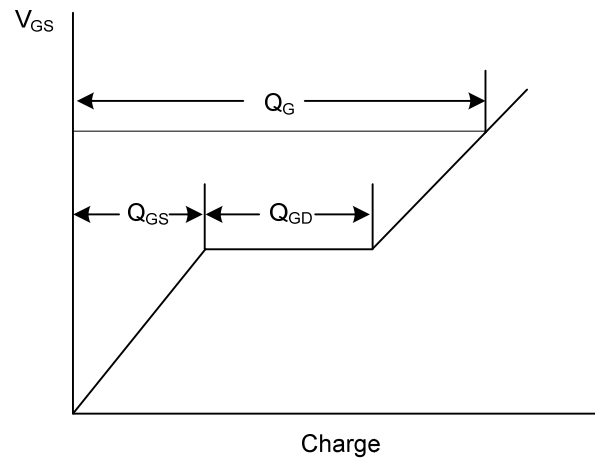
Switching Test Circuit



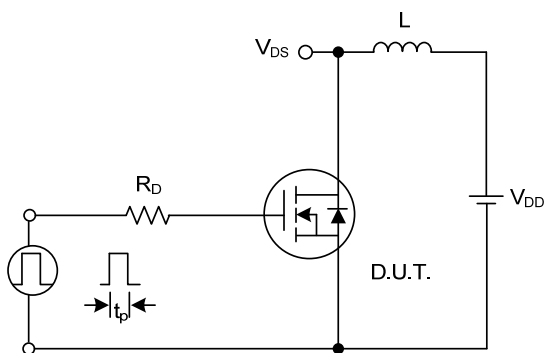
Switching Waveforms



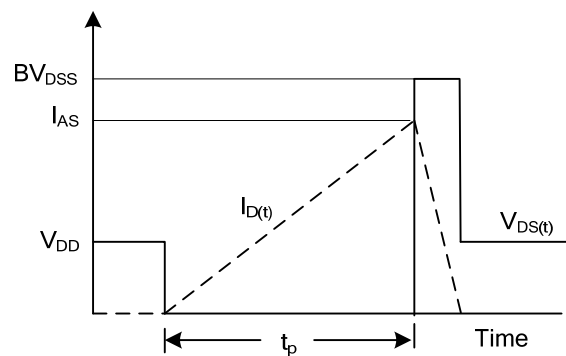
Gate Charge Test Circuit



Gate Charge Waveform

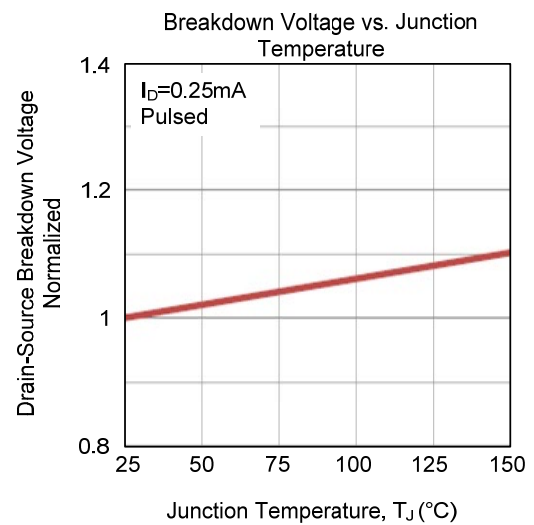
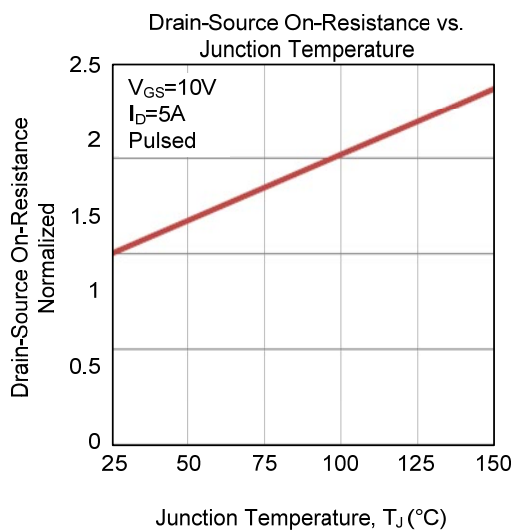
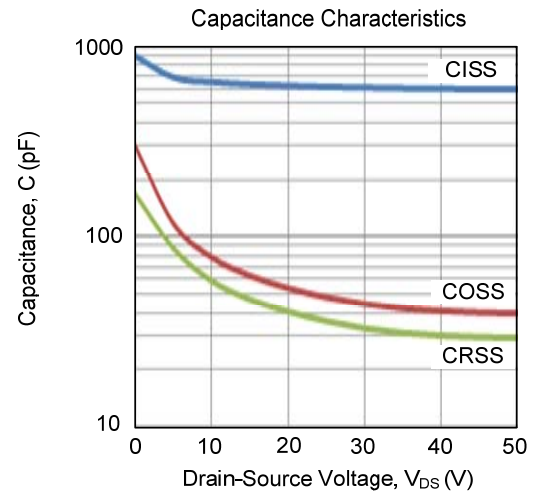
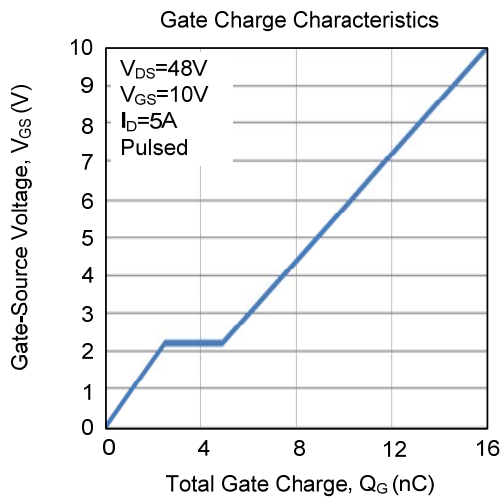
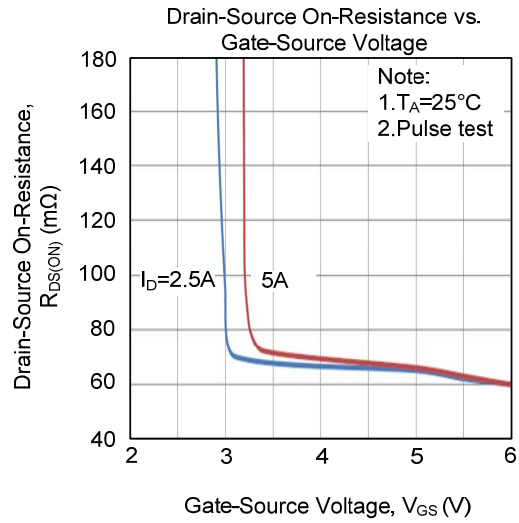
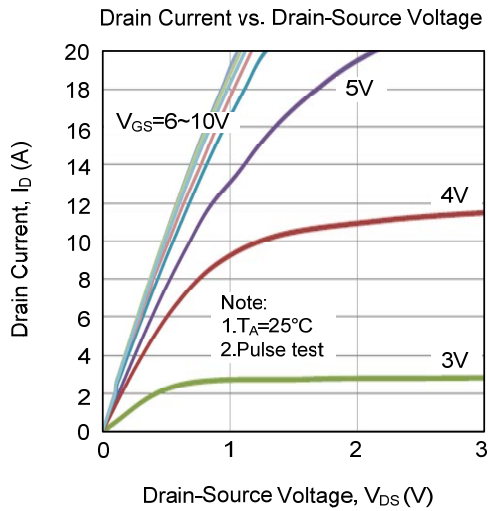


Unclamped Inductive Switching Test Circuit

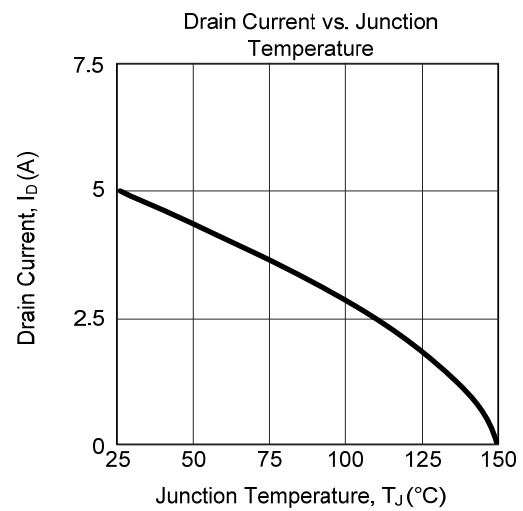
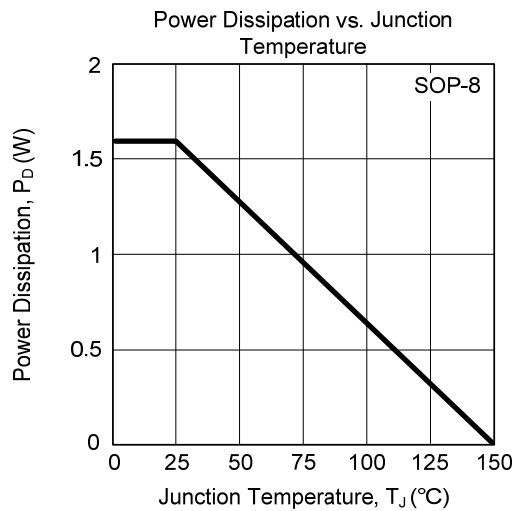
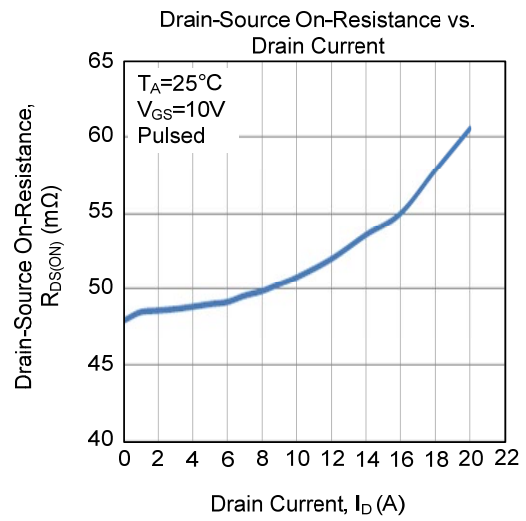
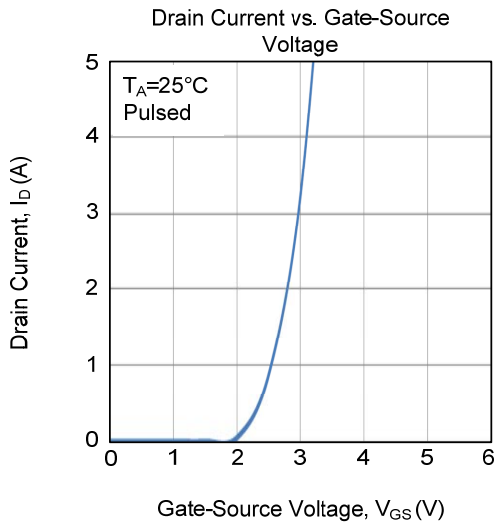
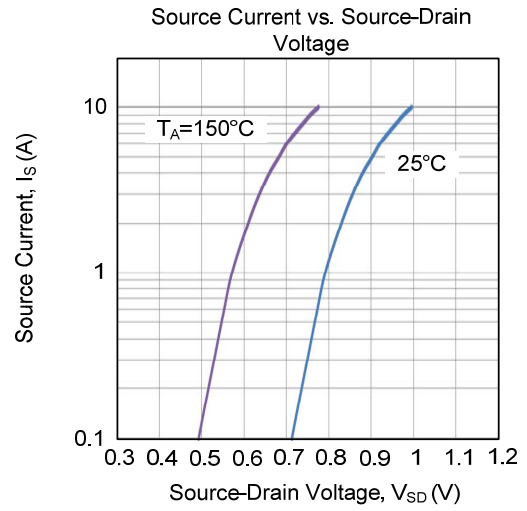
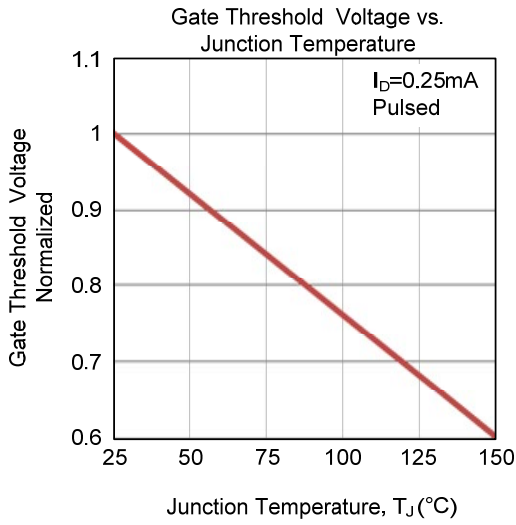


Unclamped Inductive Switching Waveforms

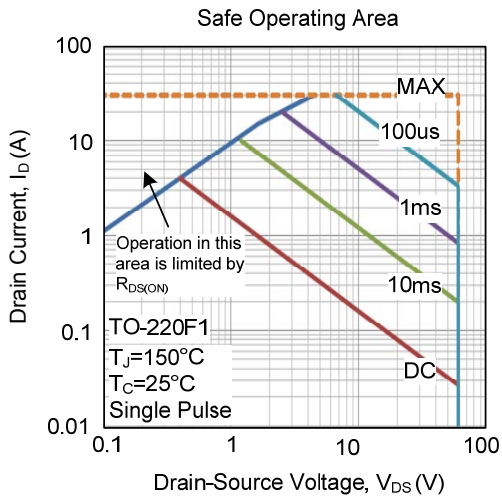
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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