



## UT3P06

Power MOSFET

### -3.0A, -60V (D-S) P-CHANNEL POWER MOSFET

#### DESCRIPTION

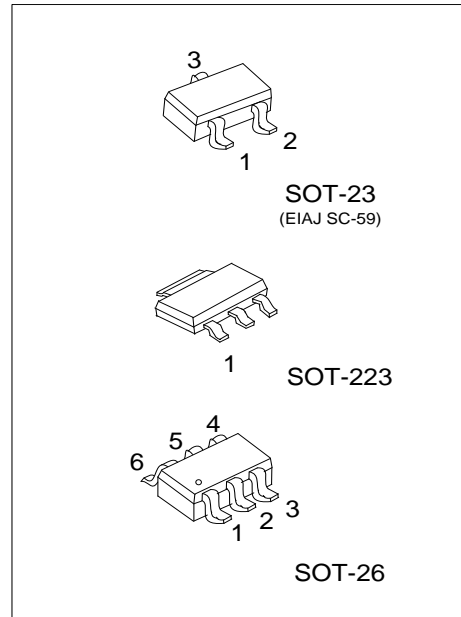
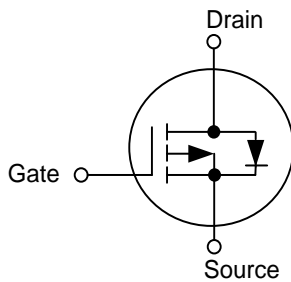
The UTC **UT3P06** is a P-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect  $R_{DS(ON)}$  and low gate charge.

This UTC **UT3P06** can be operated with -4.5V low gate voltage.

#### FEATURES

- \*  $R_{DS(ON)} \leq 220 \text{ m}\Omega$  @  $V_{GS} = -10\text{V}$ ,  $I_D = -3\text{A}$
- $R_{DS(ON)} \leq 310 \text{ m}\Omega$  @  $V_{GS} = -4.5\text{V}$ ,  $I_D = -1.9\text{A}$

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment						Packing
Lead Free	Halogen Free		1	2	3	4	5	6	
UT3P06L-AA3-R	UT3P06G-AA3-R	SOT-223	G	D	S	-	-	-	Tape Reel
UT3P06L-AE3-R	UT3P06G-AE3-R	SOT-23	G	S	D	-	-	-	Tape Reel
UT3P06L-AG6-R	UT3P06G-AG6-R	SOT-26	D	D	G	S	D	D	Tape Reel

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

<p>UT3P06G-AA3-R</p>	<p>(1) R: Tape Reel (2) AA3: SOT-223, AE3: SOT-23, AG6: SOT-26 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

SOT-223	SOT-23	SOT-26
<p>L: Lead Free G: Halogen Free Date Code</p>	<p>L: Lead Free G: Halogen Free</p>	<p>L: Lead Free G: Halogen Free</p>

■ **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
Drain Current	Continuous	$I_D$	-3	A
	Pulsed	$I_{DM}$	-10	A
Avalanche Current (L=0.1mH)		$I_{AR}$	-7	A
Power Dissipation (Note 1, 2)	SOT-223	$P_D$	2.5	W
	SOT-23		0.35	W
	SOT-26		1.1	W
Junction Temperature		$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient (Note 1,2)	SOT-223	$\theta_{JA}$	50	$^{\circ}\text{C/W}$
	SOT-23		350	$^{\circ}\text{C/W}$
	SOT-26		110	$^{\circ}\text{C/W}$

- 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. Surface Mounted on FR4 Board.  
 3.  $t \leq 5$  sec.

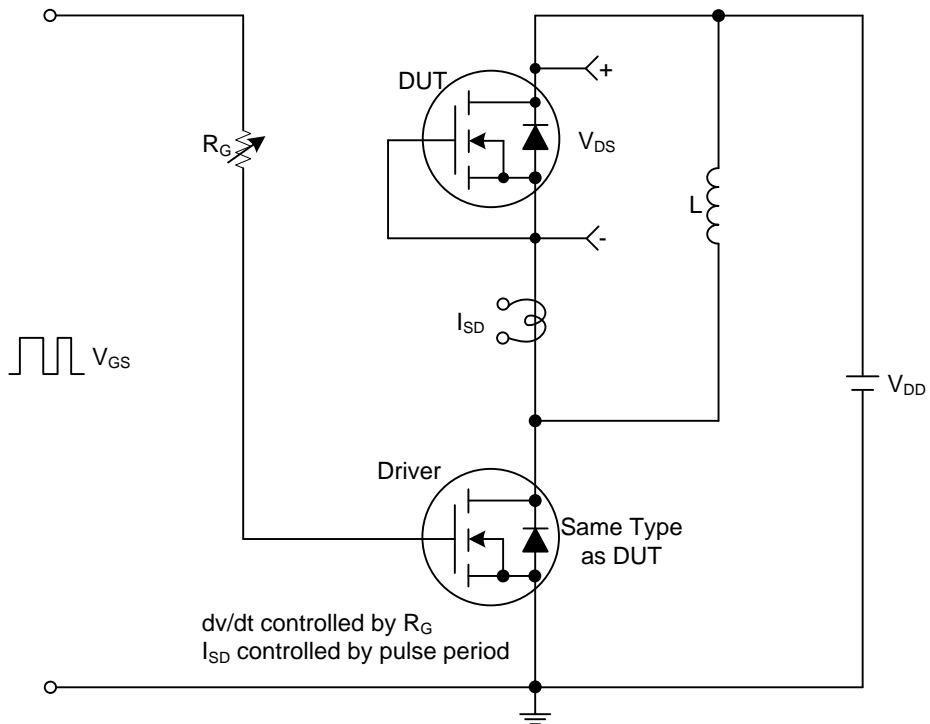
## ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-60			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V			-1	μA
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C			-50	
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>				nA
	Reverse					
		V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 1)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-3A		120	220	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1.9A		170	310	
On State Drain Current (Note 1)	I <sub>D(ON)</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-10			A
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz	450	540	650	pF
Output Capacitance	C <sub>OSS</sub>		40	50	70	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>		30	38	55	pF
<b>SWITCHING PARAMETERS (Note 2)</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-3A		13	18	nC
Gate to Source Charge	Q <sub>GS</sub>		2.3			nC
Gate to Drain Charge	Q <sub>GD</sub>		3.3			nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-30V, V <sub>GEN</sub> =-10V, I <sub>D</sub> =-1A, R <sub>L</sub> =30 Ω, R <sub>G</sub> =6Ω		5.6	16	ns
Rise Time	t <sub>R</sub>		15	24	ns	
Turn-OFF Delay Time	t <sub>D(OFF)</sub>		22	45	ns	
Fall-Time	t <sub>F</sub>		15	25	ns	
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (Note 2)</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-1.7	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				-10	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-3A, V <sub>GS</sub> =0V (Note 1)		-0.8	-1.2	V

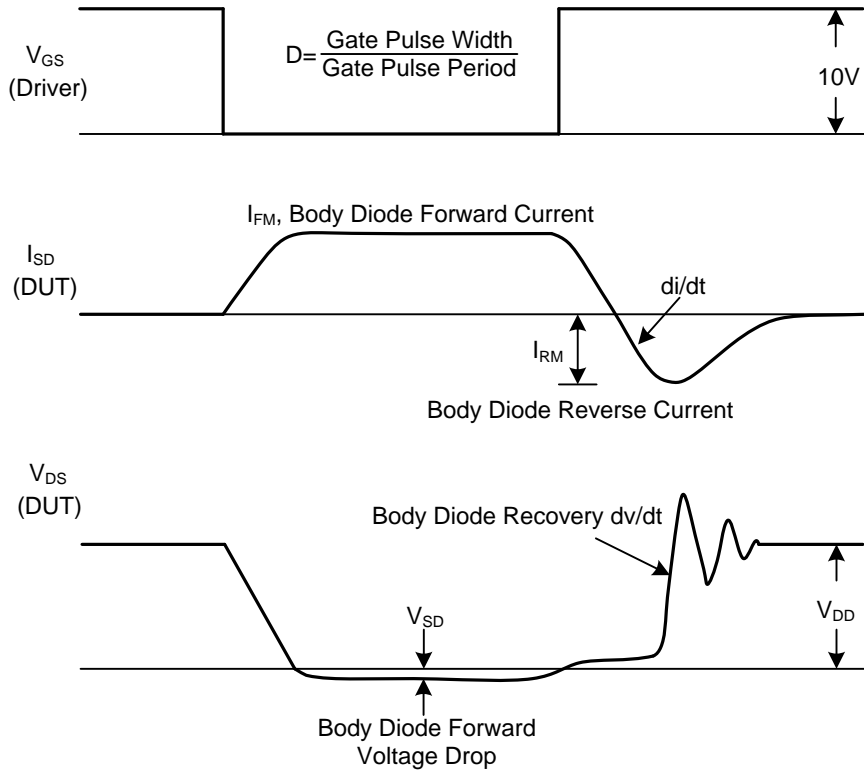
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Guaranteed by design, not subject to production testing.

## TEST CIRCUITS AND WAVEFORMS



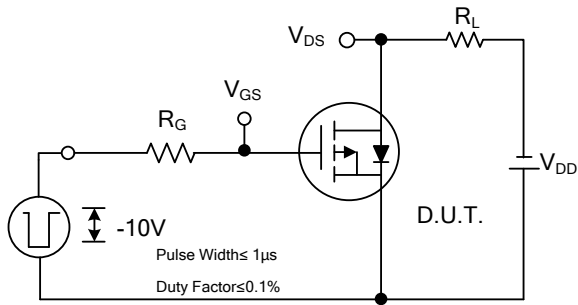
Peak Diode Recovery dv/dt Test Circuit



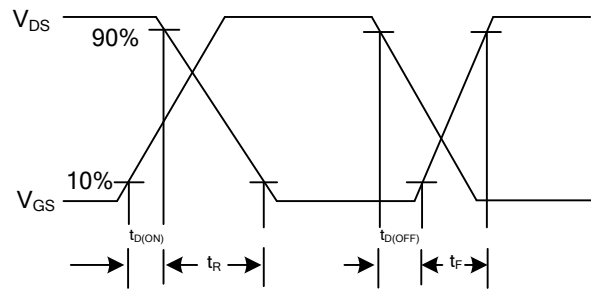
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

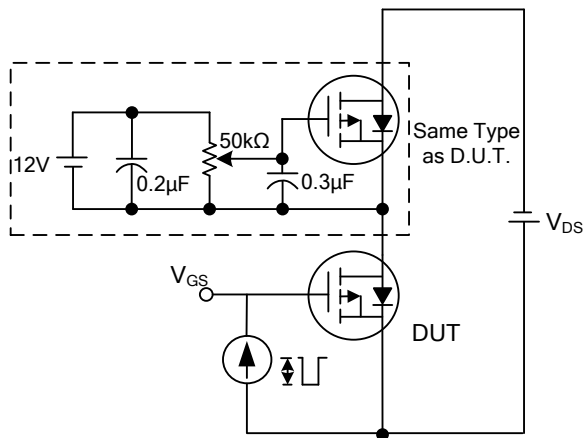
## TEST CIRCUITS AND WAVEFORMS



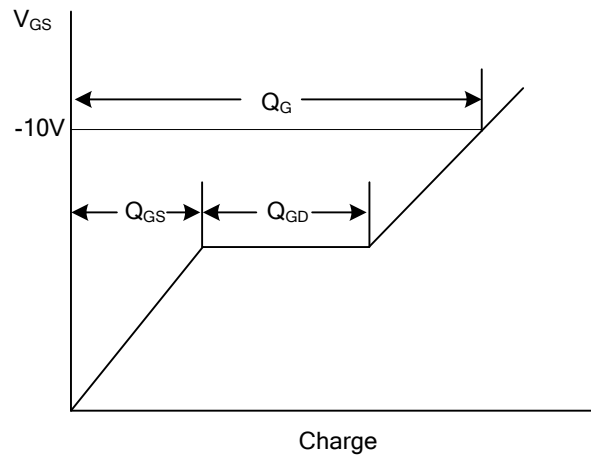
**Switching Test Circuit**



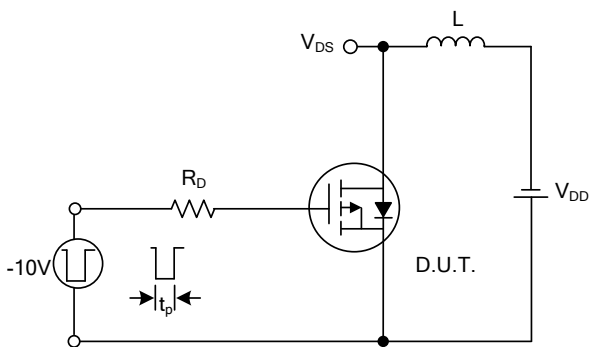
**Switching Waveforms**



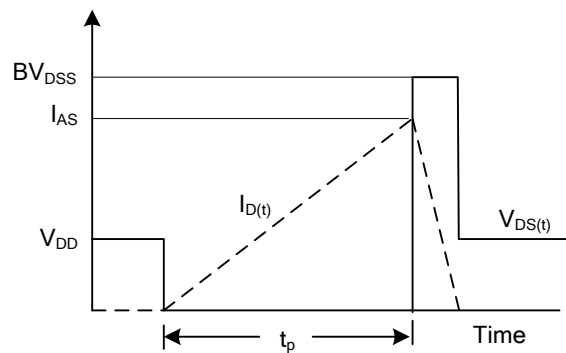
**Gate Charge Test Circuit**



**Gate Charge Waveform**

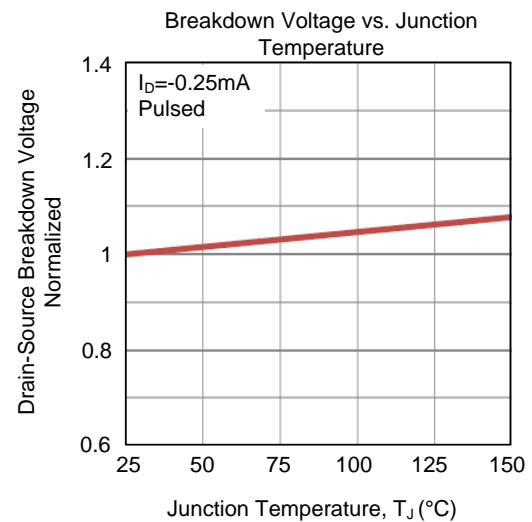
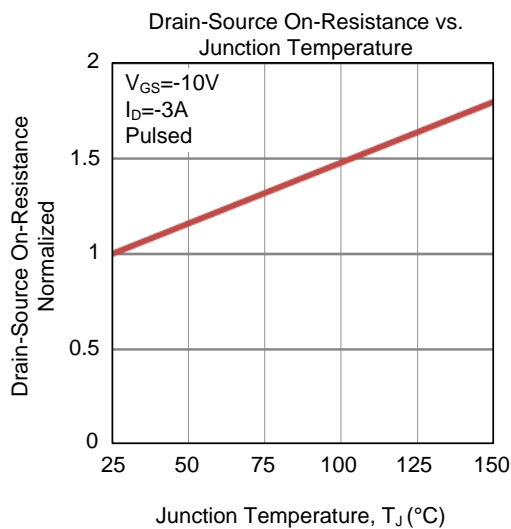
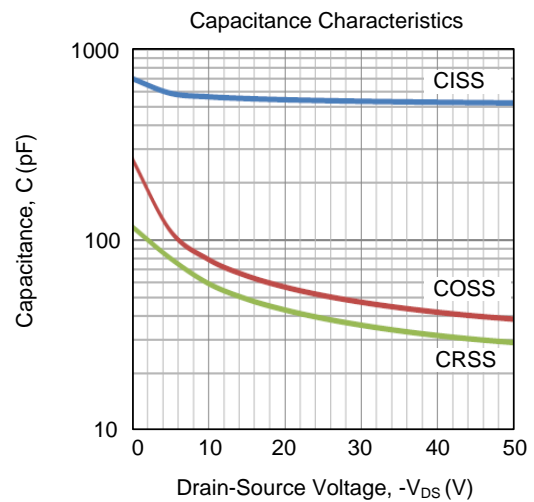
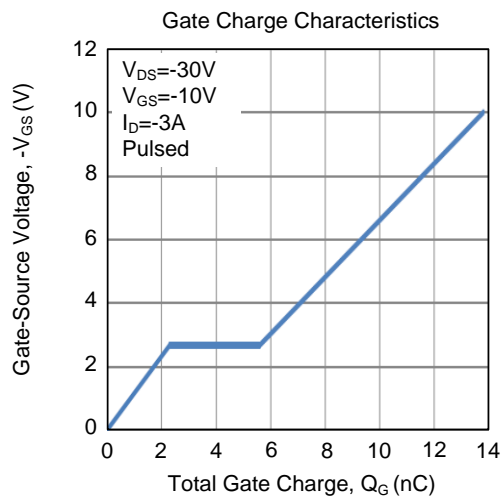
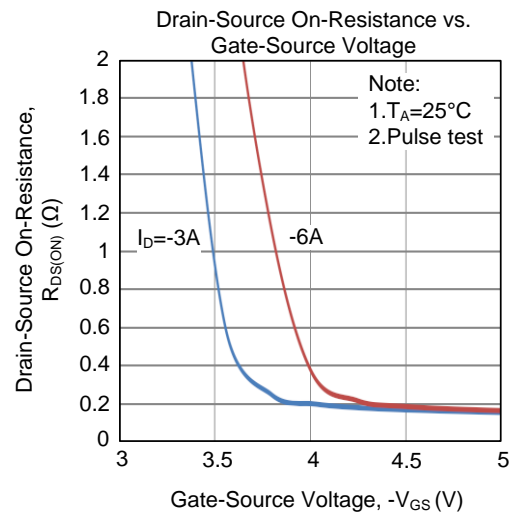
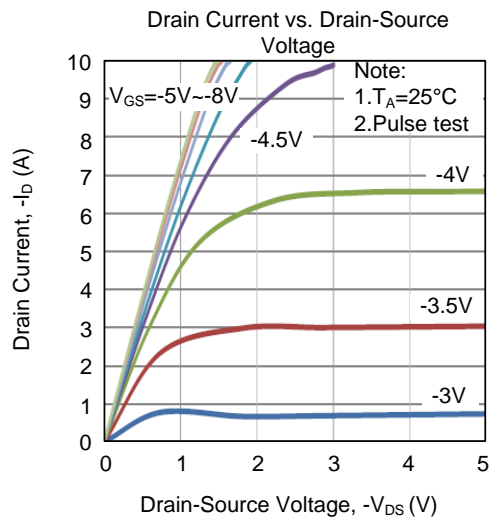


**Unclamped Inductive Switching Test Circuit**

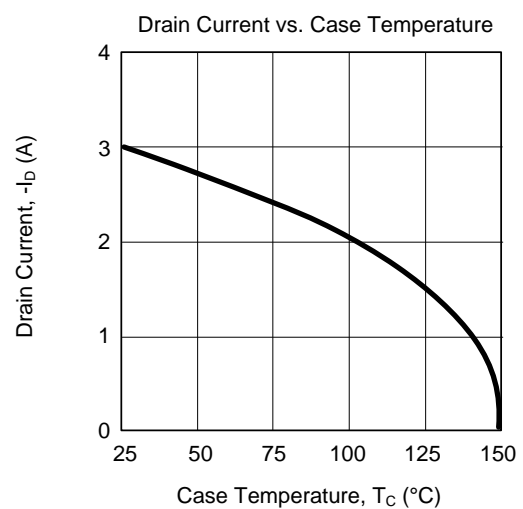
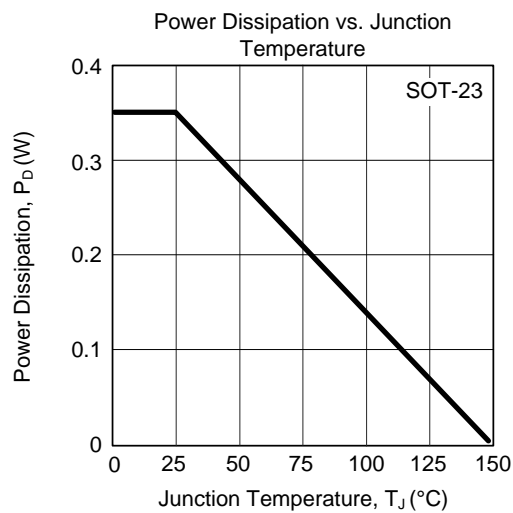
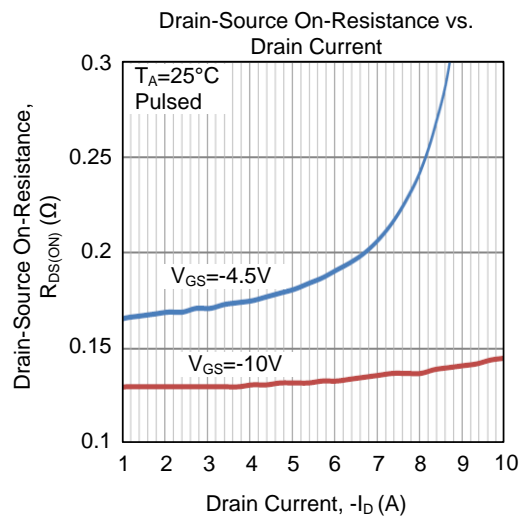
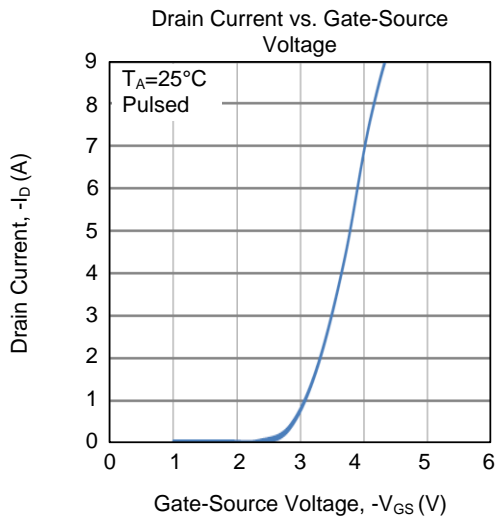
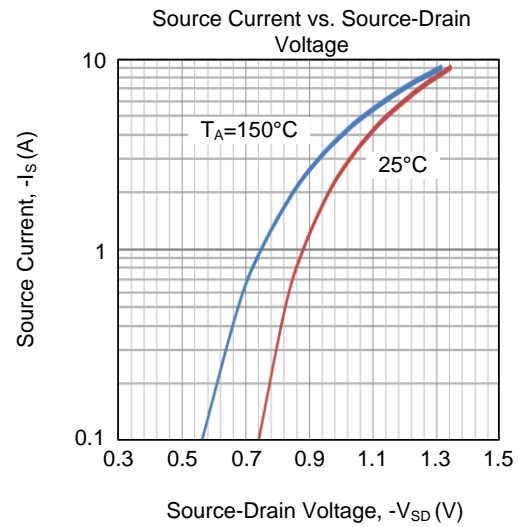
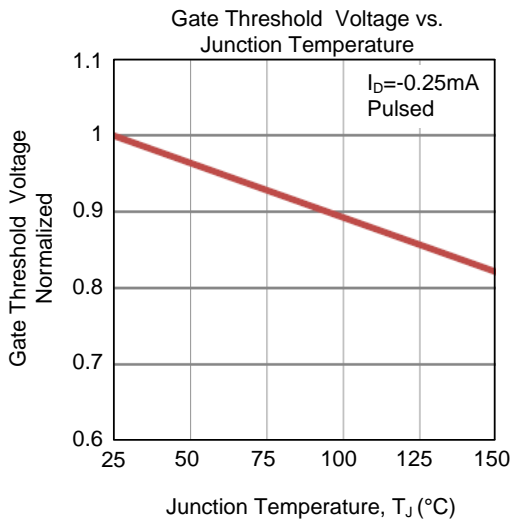


**Unclamped Inductive Switching Waveforms**

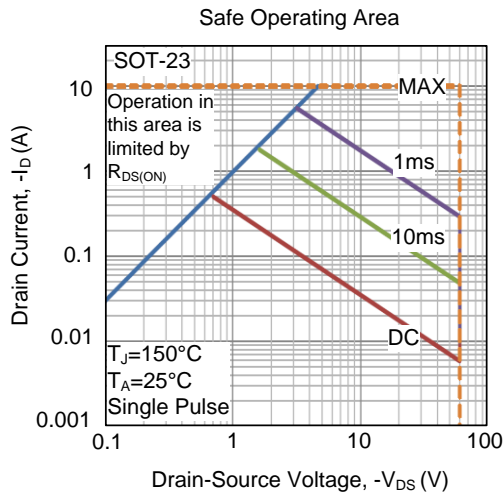
## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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