



## UT24N04

## POWER MOSFET

### 24A, 40V N-CHANNEL POWER MOSFET

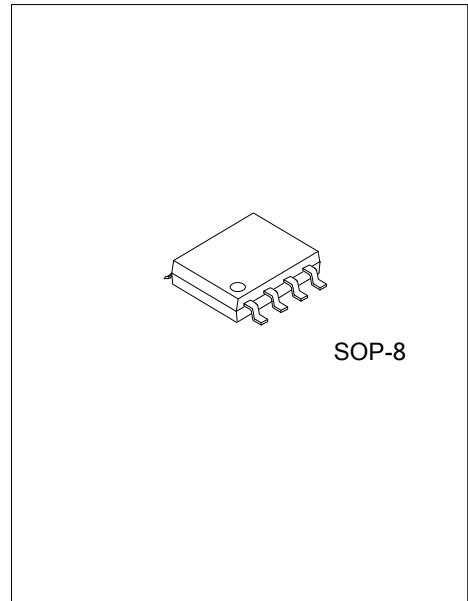
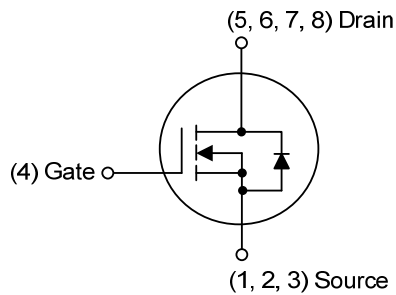
#### DESCRIPTION

The UTC **UT24N04** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect  $R_{DS(ON)}$  and high switching speed.

#### FEATURES

- \*  $R_{DS(ON)} \leq 17m\Omega$  @  $V_{GS}=10V, I_D=12A$
- $R_{DS(ON)} \leq 22m\Omega$  @  $V_{GS}=4.5V, I_D=12A$
- \* High Switching Speed

#### SYMBOL



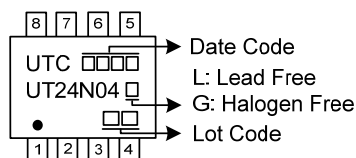
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT24N04L-S08-R	UT24N04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UT24N04G-S08-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) S08: SOP-8</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
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#### MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	40	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	24
	Pulsed (Note 2)	$I_{DM}$	48
Single Pulse Avalanche Energy	$E_{AS}$	27.1	mJ
Peak Diode Recovery $dv/dt$ (Note 4)	$dv/dt$	2.65	V/ns
Power Dissipation	$P_D$	6.25	W
Junction Temperature	$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-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.  $L=0.1\text{mH}$ ,  $I_{AS}=23.3\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

4.  $I_{SD}\leq 25.4\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J = 25^{\circ}\text{C}$

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^{\circ}\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	20	$^{\circ}\text{C}/\text{W}$

Note: The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

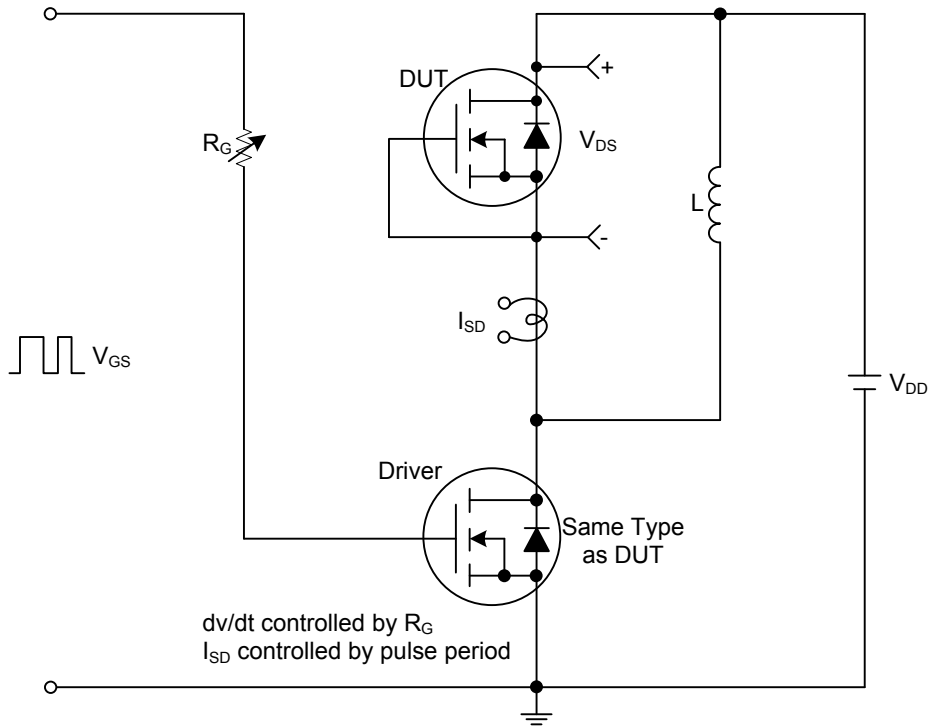
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub> =25°C, unless otherwise specified)

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	40			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	Forward	I <sub>GSS</sub> V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			+100	nA
	Reverse				-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	0.6		1.8	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =12A			17	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =12A			22	mΩ
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		579		pF
Output Capacitance	C <sub>OSS</sub>			88		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			73		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	Q <sub>G</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =24A, I <sub>G</sub> =1mA (Note 1, 2)		19		nC
Gate to Source Charge	Q <sub>GS</sub>			1.8		nC
Gate to Drain Charge	Q <sub>GD</sub>			3.5		nC
Turn-on Delay Time (Note 1)	t <sub>D(ON)</sub>	V <sub>DD</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =24A, R <sub>G</sub> =3.3Ω (Note 1, 2)		3.2		ns
Rise Time	t <sub>R</sub>			16		ns
Turn-off Delay Time	t <sub>D(OFF)</sub>			20		ns
Fall-Time	t <sub>F</sub>			20		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				24	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				48	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =24A, V <sub>GS</sub> =0V			1.4	V
Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =24A, V <sub>GS</sub> =0V,		24		nS
Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> /dt =100A/μs		12		nC

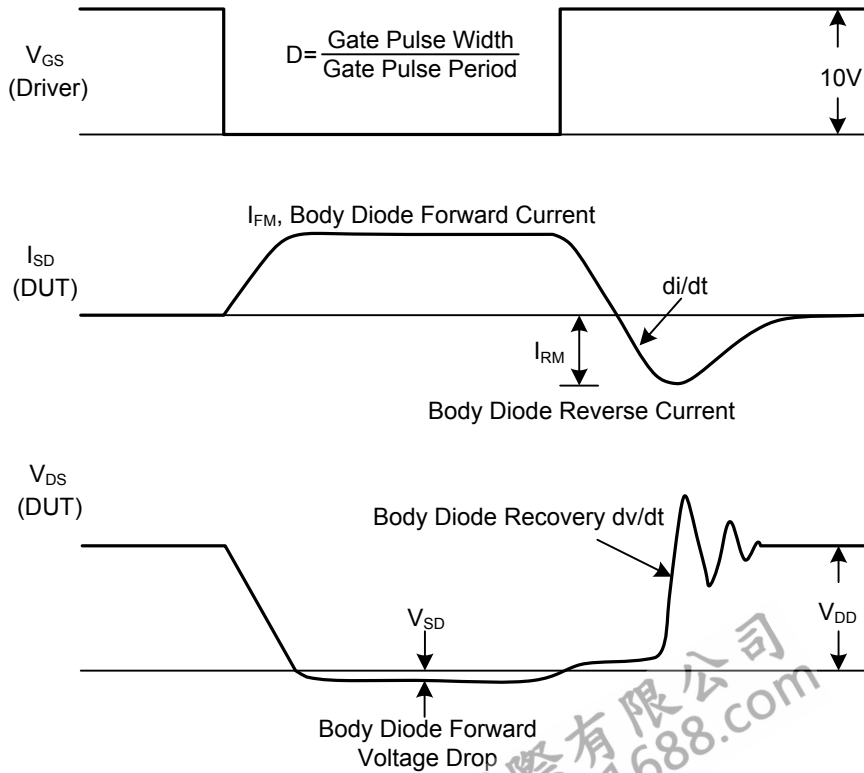
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



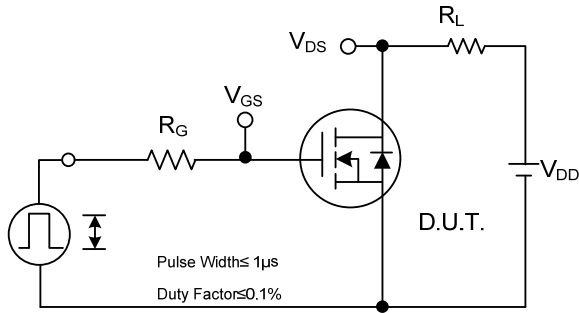
Peak Diode Recovery dv/dt Test Circuit



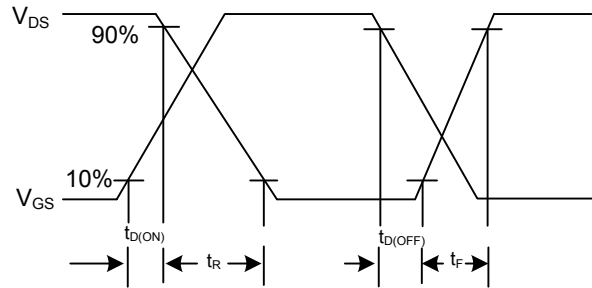
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

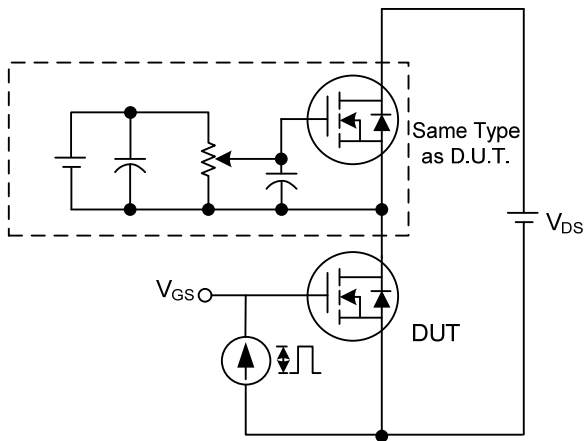
## TEST CIRCUITS AND WAVEFORMS



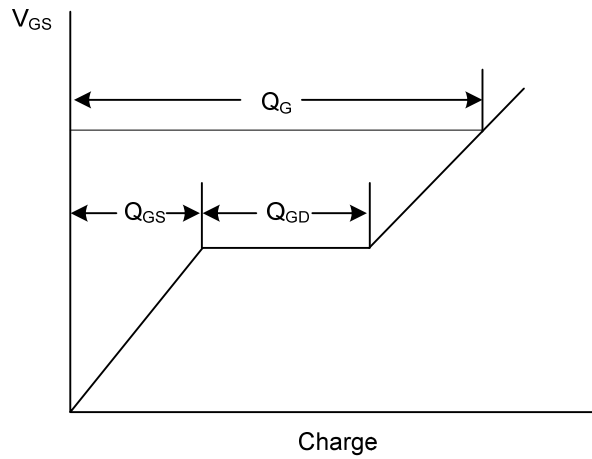
Switching Test Circuit



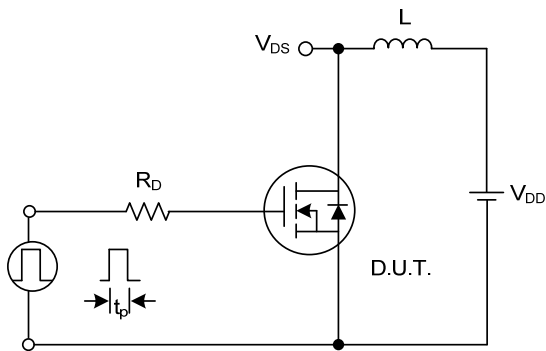
Switching Waveforms



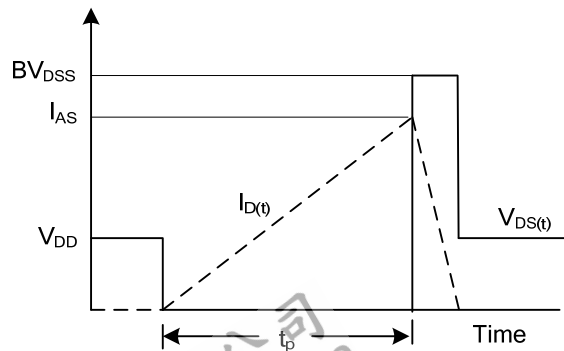
Gate Charge Test Circuit



Gate Charge Waveform

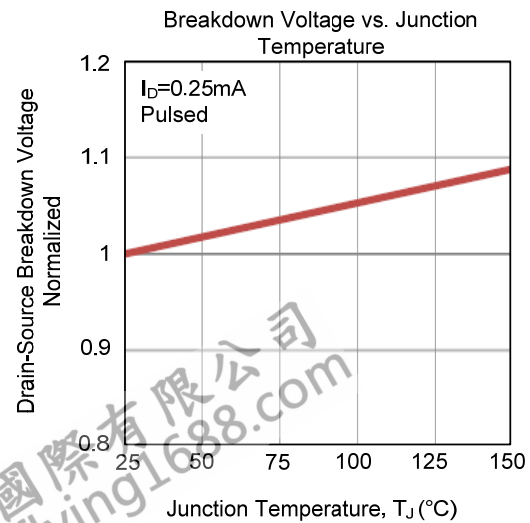
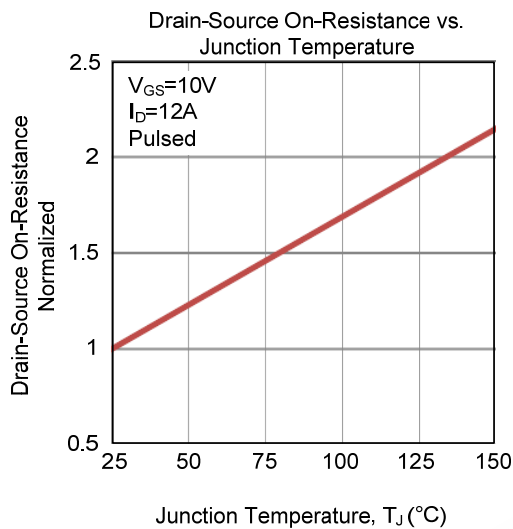
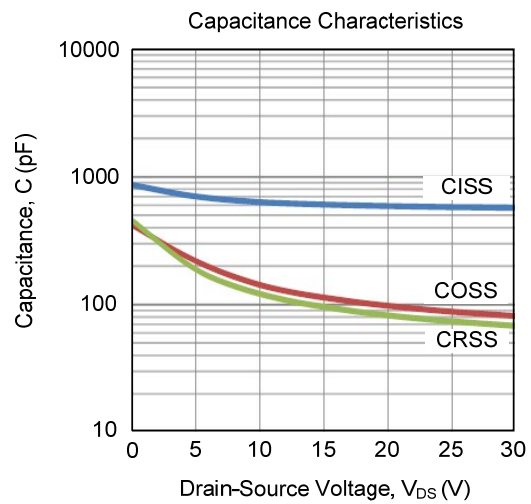
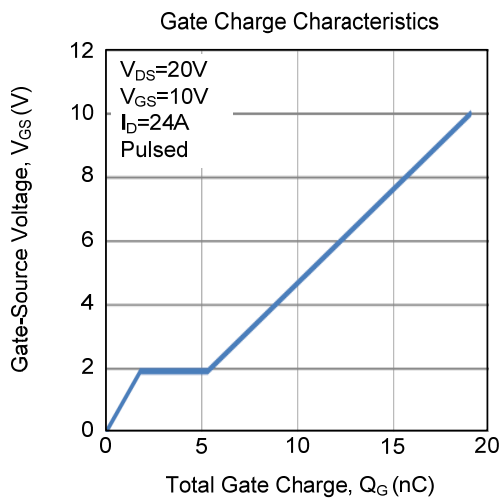
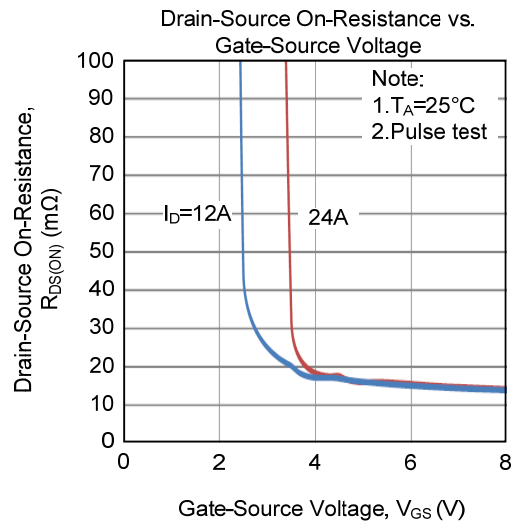
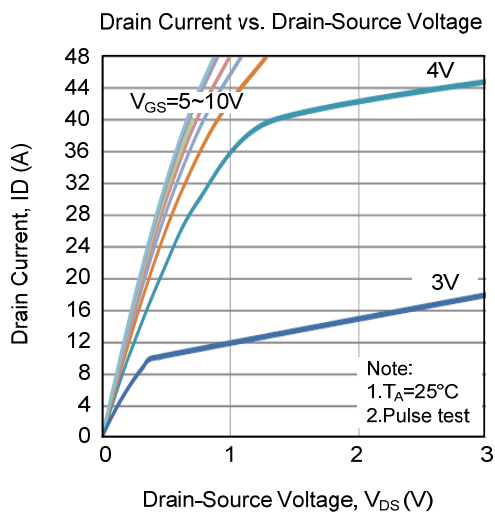


Unclamped Inductive Switching Test Circuit

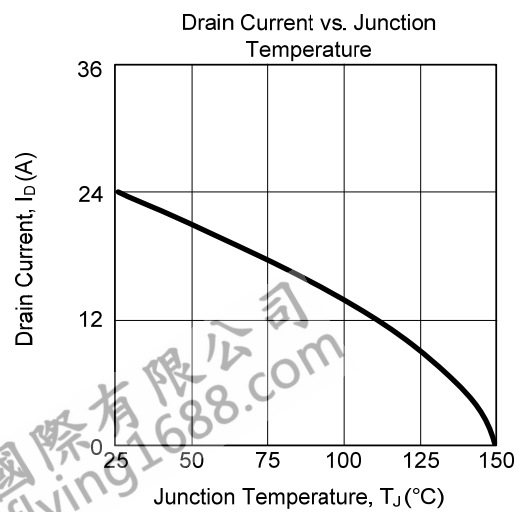
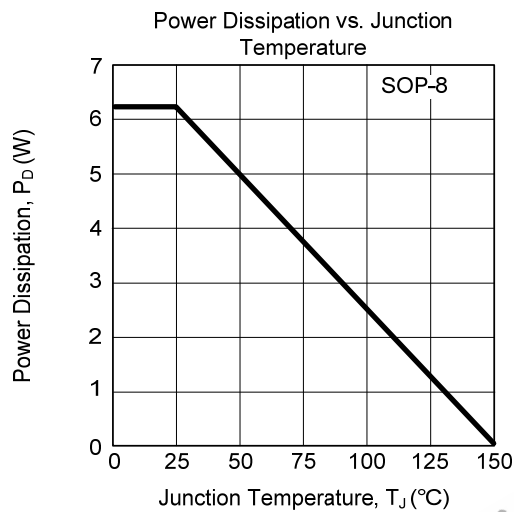
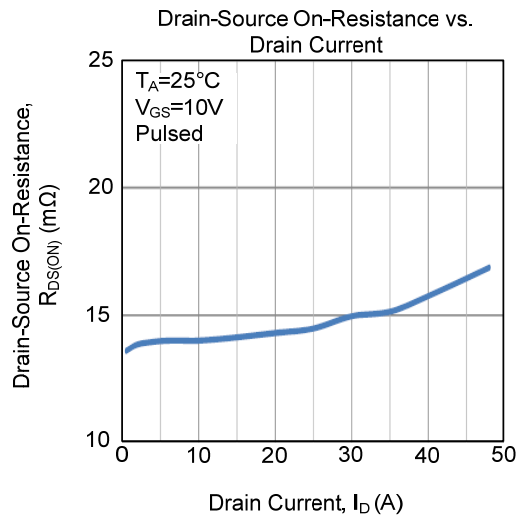
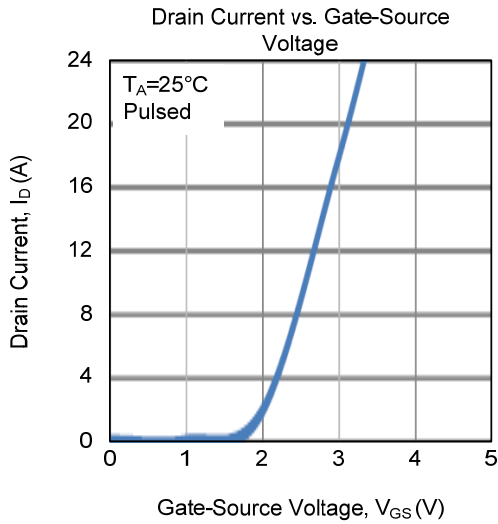
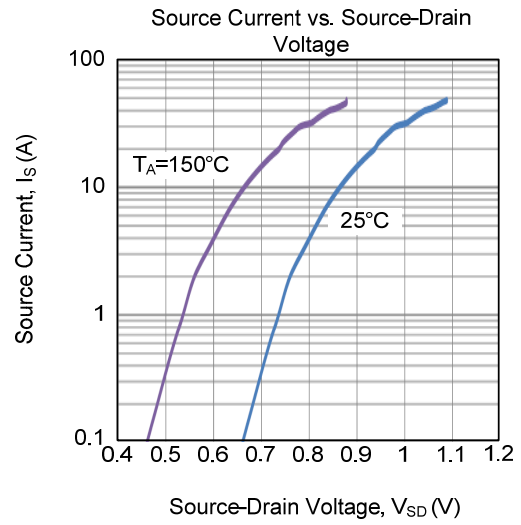
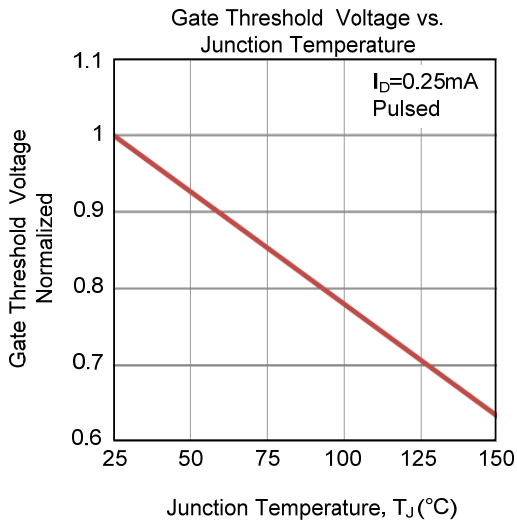


Unclamped Inductive Switching Waveforms

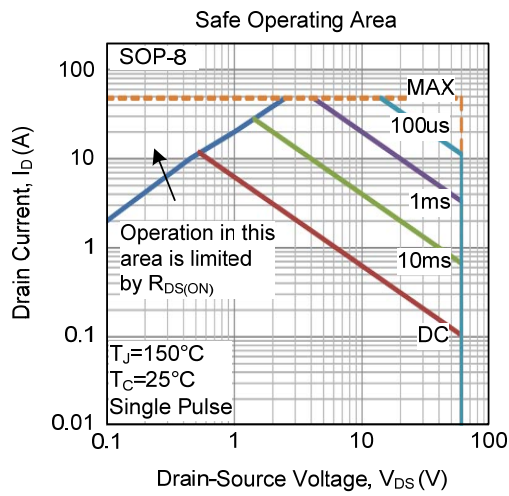
## TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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