



1P40

POWER MOSFET

-1A, -400V P-CHANNEL POWER MOSFET

■ DESCRIPTION

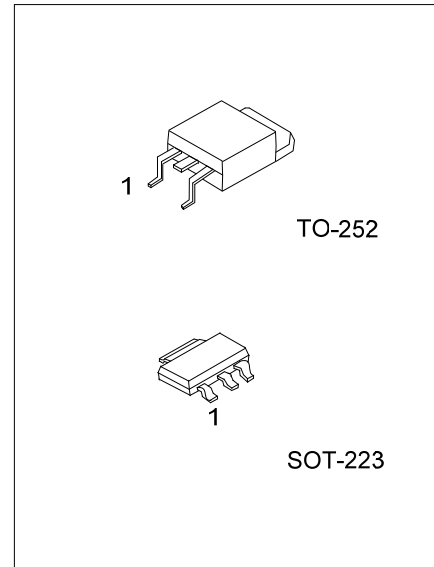
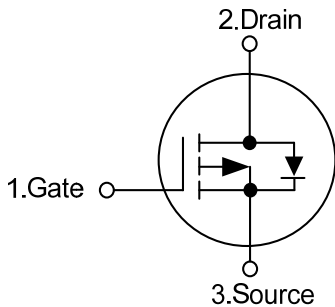
The UTC **1P40** is a P-channel MOS Field Effect Transistor. it uses UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance.

The UTC **1P40** is suitable for high voltage switching applications.

■ FEATURES

- * $R_{DS(ON)} \leq 11.6\Omega$ @ $V_{GS}=-10V, I_D=-0.5A$
- * High switching speed
- * Low input capacitance

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1P40L-AA3-R	1P40G-AA3-R	SOT-223	G	D	S	Tape Reel
1P40L-TN3-R	1P40G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>1P40G-AA3-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) AA3: SOT-223, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

SOT-223	TO-252

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-400	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	DC	I_D	-1	A
	Pulsed (Note 2)	I_{DM}	-2	A
Single Avalanche Energy (Note 3)		E_{AS}	104	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	12.8	V/ns
Power Dissipation ($T_C=25^\circ\text{C}$)	SOT-223	P_D	6.9	W
	TO-252		38	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. $L=86\text{mH}$, $I_{AS}=-1.56\text{A}$, $V_{DD}=-90\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$.

4. $I_{SD}\leq-1.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	150	$^\circ\text{C}/\text{W}$
	TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case (Note)	SOT-223	θ_{JC}	19.5	$^\circ\text{C}/\text{W}$
	TO-252		3.28	$^\circ\text{C}/\text{W}$

Note: The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

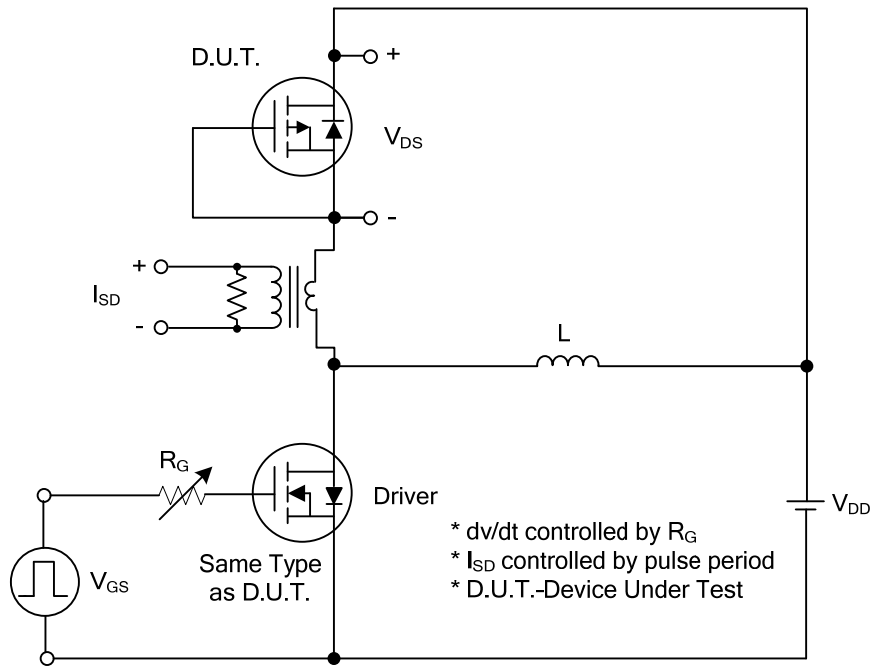
■ ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-400V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	Forward	V _{GS} =+30V, V _{DS} =0V			+100	nA
	Reverse	V _{GS} =-30V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D =-250μA	-2.0		-4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-0.5A			11.6	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-25V, f=1.0MHz		158		pF
Output Capacitance	C _{OSS}			35		pF
Reverse Transfer Capacitance	C _{RSS}			5		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =-100V, V _{GS} =-10V, I _D =-1.0A, I _G =-1mA (Note 1, 2)		7		nC
Gate to Source Charge	Q _{GS}			2.2		nC
Gate to Drain Charge	Q _{GD}			1.5		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =-40V, V _{GS} =-10V, I _D =-0.8A, R _G =-25Ω (Note 1, 2)		4		ns
Rise Time	t _R			14		ns
Turn-OFF Delay Time	t _{D(OFF)}			27		ns
Fall-Time	t _F			39		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				-1	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				-2	A
Diode Forward Voltage	V _{SD}	I _F =-1.0A, V _{GS} =0V			-1.4	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =-1.0A, V _{GS} =0V, di/dt=100A/μs		150		ns
Body Diode Reverse Recovery Charge	Q _{rr}			885		nC

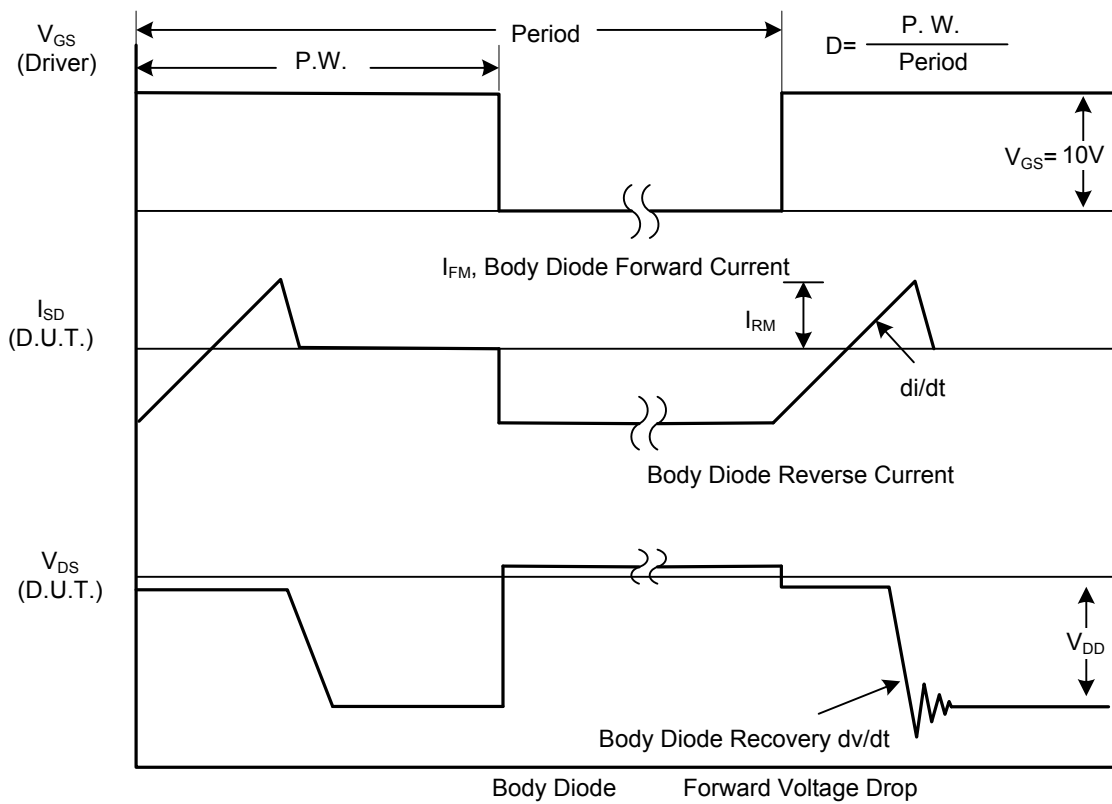
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

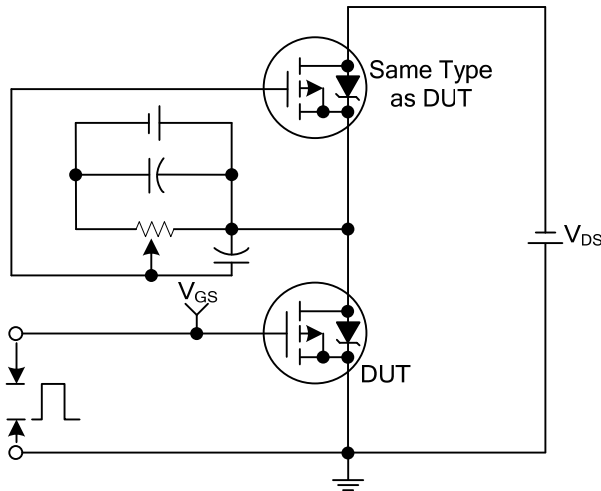


Peak Diode Recovery dv/dt Test Circuit

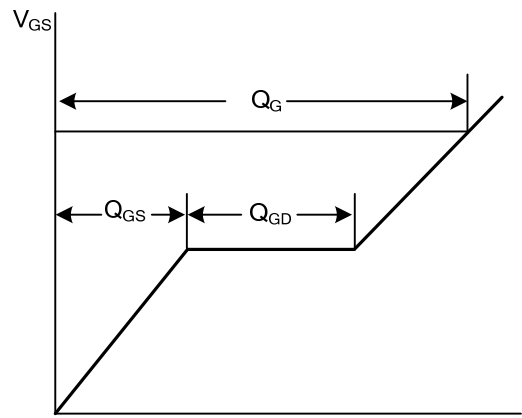


Peak Diode Recovery dv/dt Waveforms

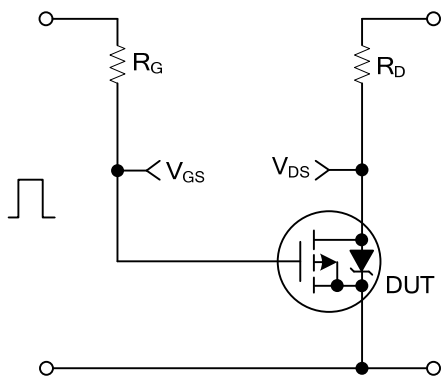
■ TEST CIRCUITS AND WAVEFORMS



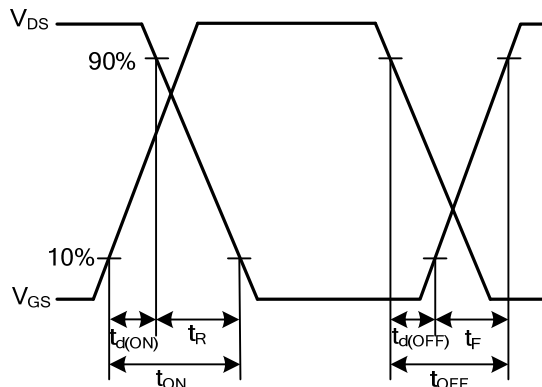
Gate Charge Test Circuit



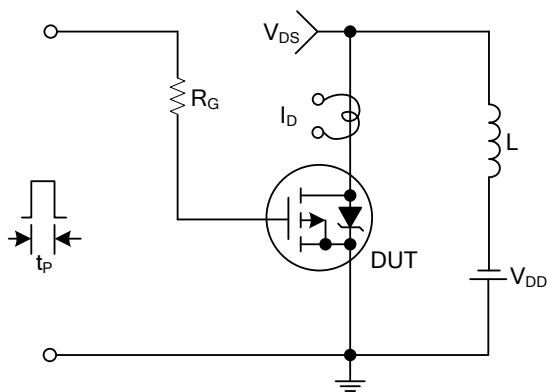
Gate Charge Waveforms



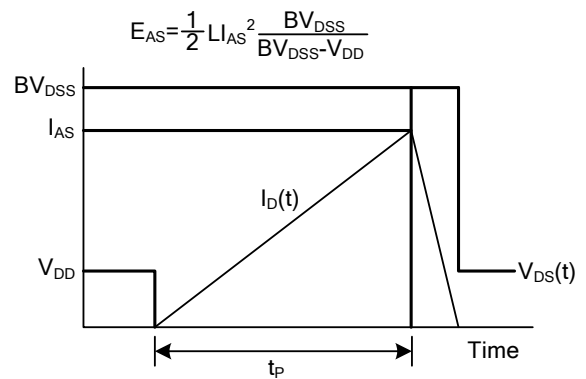
Resistive Switching Test Circuit



Resistive Switching Waveforms

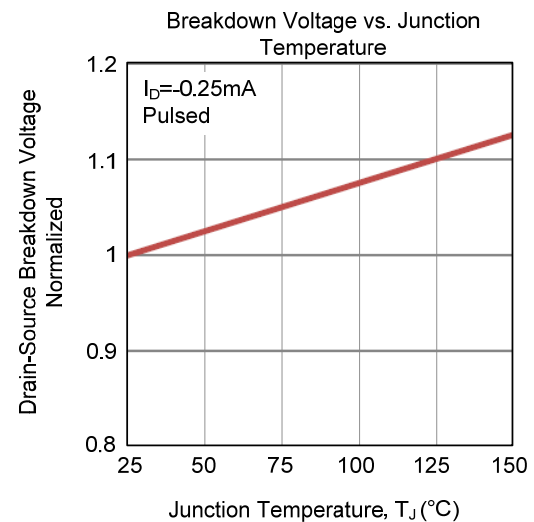
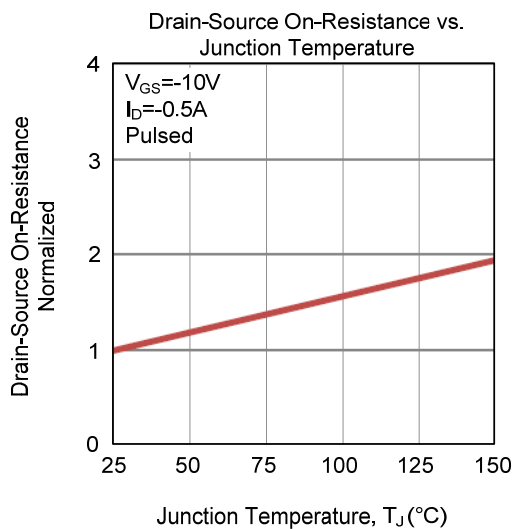
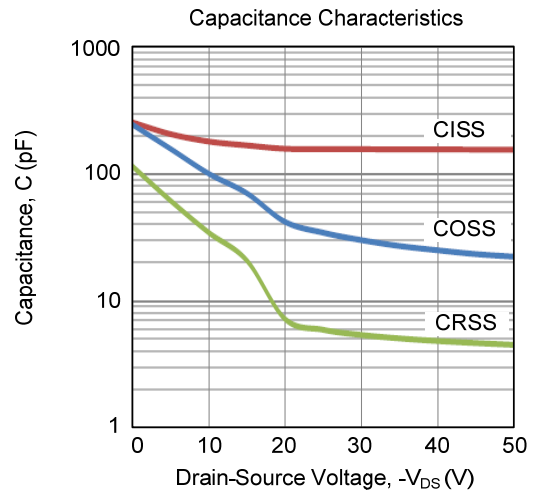
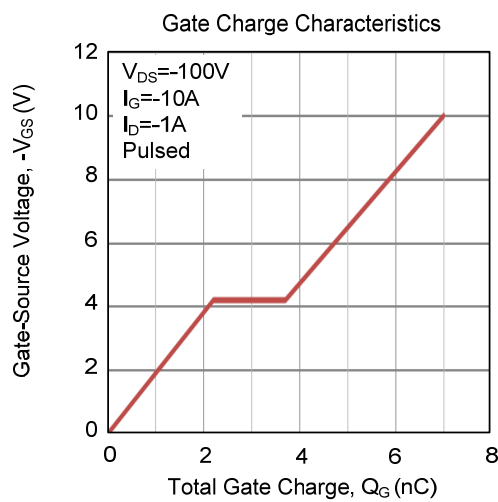
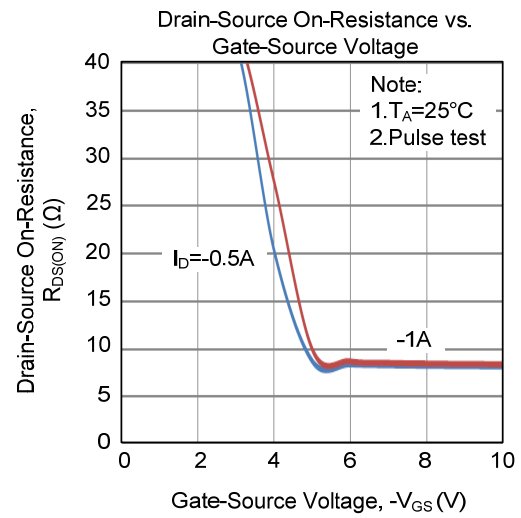
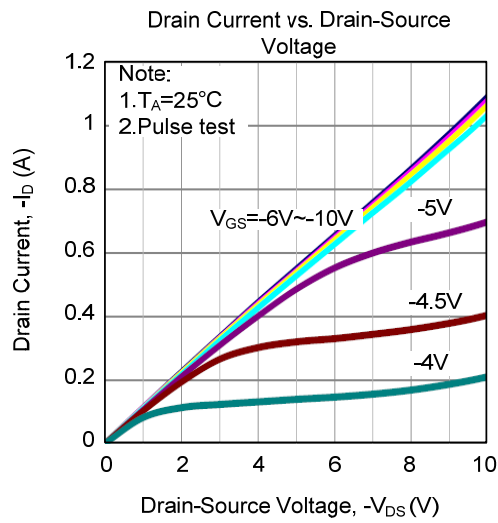


Unclamped Inductive Switching Test Circuit

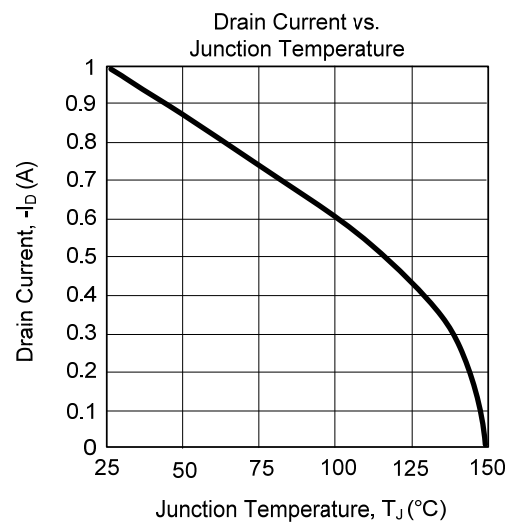
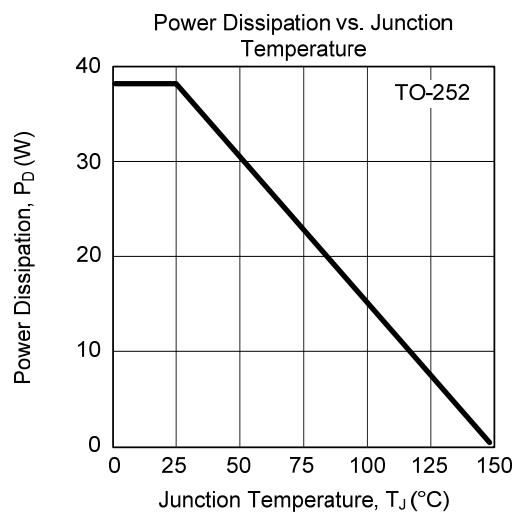
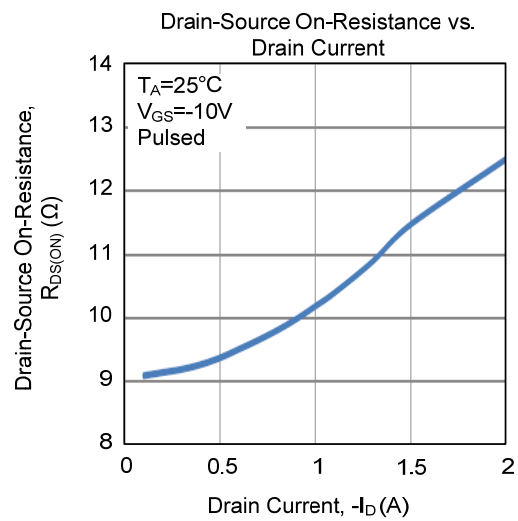
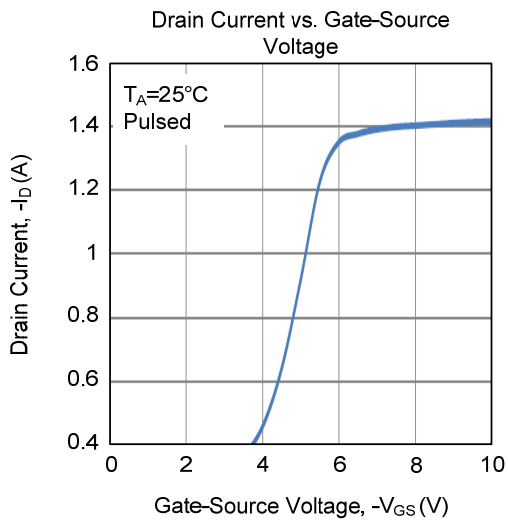
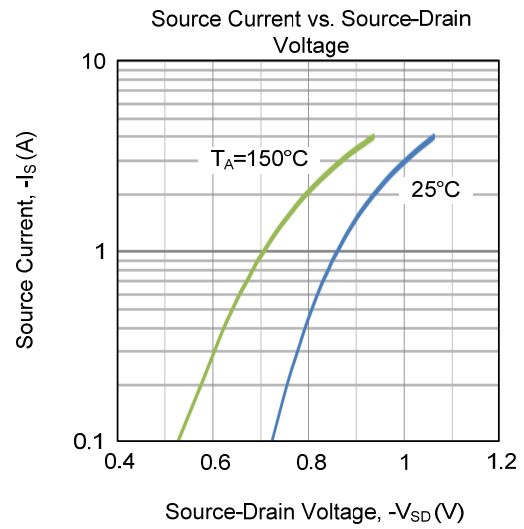
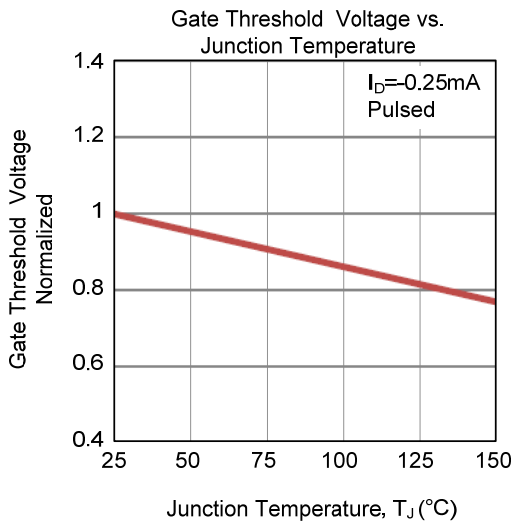


Unclamped Inductive Switching Waveforms

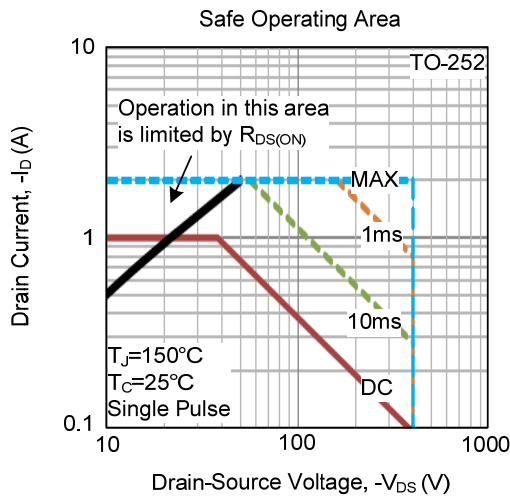
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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