



UTT50P10-H

Power MOSFET

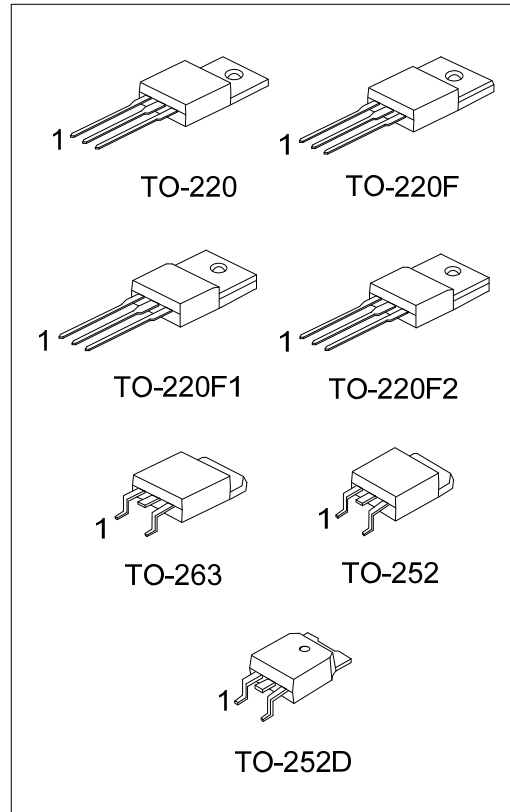
-50A, -100V P-CHANNEL POWER MOSFET

■ DESCRIPTION

The UTC **UTT50P10-H** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed and a minimum on-state resistance. It can also withstand high energy in the avalanche.

■ FEATURES

- * $R_{DS(ON)} \leq 43 \text{ m}\Omega @ V_{GS} = -10\text{V}, I_D = -15\text{A}$
- * $R_{DS(ON)} \leq 48 \text{ m}\Omega @ V_{GS} = -4.5\text{V}, I_D = -10\text{A}$
- * High Switching Speed
- * Fast switching
- * 100% EAS Guaranteed
- * Improved dv/dt capability



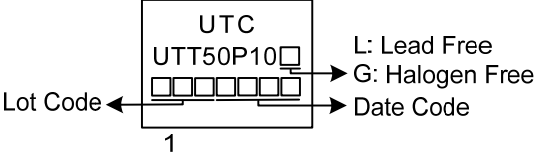
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT50P10L-TA3-T	UTT50P10G-TA3-T	TO-220	G	D	S	Tube
UTT50P10L-TF1-T	UTT50P10G-TF1-T	TO-220F1	G	D	S	Tube
UTT50P10L-TF2-T	UTT50P10G-TF2-T	TO-220F2	G	D	S	Tube
UTT50P10L-TF3-T	UTT50P10G-TF3-T	TO-220F	G	D	S	Tube
UTT50P10L-TN3-R	UTT50P10G-TN3-R	TO-252	G	D	S	Tape Reel
UTT50P10L-TND-R	UTT50P10G-TND-R	TO-252D	G	D	S	Tape Reel
UTT50P10L-TQ2-T	UTT50P10G-TQ2-T	TO-263	G	D	S	Tube
UTT50P10L-TQ2-R	UTT50P10G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>UTT50P10G-TA3-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TN3: TO-252, TND: TO-252D, TQ2: TO-263</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-100	V
Gate-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current	Continuous	I_D	-50	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	-120	A
Avalanche energy	Single Pulsed (Note 3)	E_{AS}	202	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.3	V/ns
Power Dissipation	TO-220/TO-263	P_D	140	W
	TO-220F/TO-220F1 TO-220F2		45	W
	TO-252/TO-252D		60	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. $L=0.1\text{mH}$, $I_{AS}=-63.6\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J = 25^{\circ}\text{C}$.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-263	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-252/TO-252D		110	$^{\circ}\text{C}/\text{W}$
	TO-220/TO-263		0.89	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1 TO-220F2		2.77	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-252/TO-252D	θ_{JC}	2.08	$^{\circ}\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

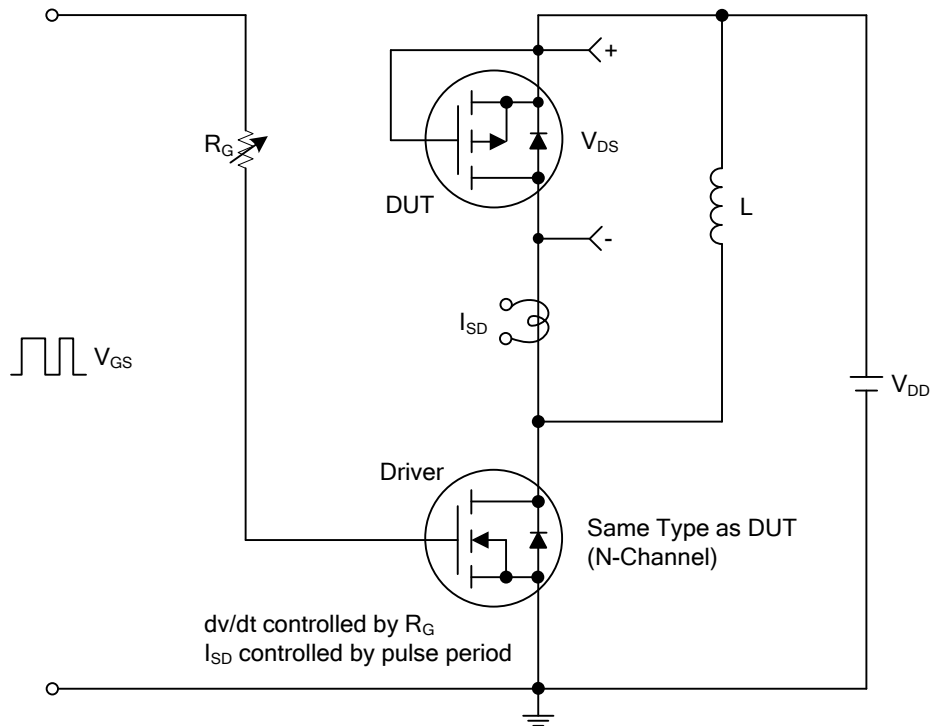
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	-100			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-100V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	Forward	I _{GSS} V _{DS} =0V, V _{GS} =+20V			+100	nA
	Reverse		V _{DS} =0V, V _{GS} =-20V			-100
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	-1.2		-2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-15A		32	43	mΩ
		V _{GS} =-4.5V, I _D =-10A		35	48	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-25V, f=1.0MHz		7950		pF
Output Capacitance	C _{OSS}			375		pF
Reverse Transfer Capacitance	C _{RSS}			285		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =-50V, V _{GS} =-10V, I _D =-50A		117		nC
Gate to Source Charge	Q _{GS}			25		nC
Gate to Drain Charge	Q _{GD}			26		nC
Turn-on Delay Time (Note 1)	t _{D(ON)}	V _{DD} =-50V, V _{GS} =-10V, I _D =-50A, R _G =3Ω		17		ns
Rise Time	t _R			21		ns
Turn-off Delay Time	t _{D(OFF)}			115		ns
Fall-Time	t _F			46		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Pulsed Current	I _S				-50	A
Drain-Source Diode Forward Voltage (Note 1)	I _{SM}				-100	A
Maximum Body-Diode Continuous Current	V _{SD}	I _S =-1.0A, V _{GS} =0V			-1.0	V
Body Diode Reverse Recovery Time	t _{RR}	I _F =-30A, di/dt=100A/μs		64		ns
Body Diode Reverse Recovery Charge	Q _{RR}				131	

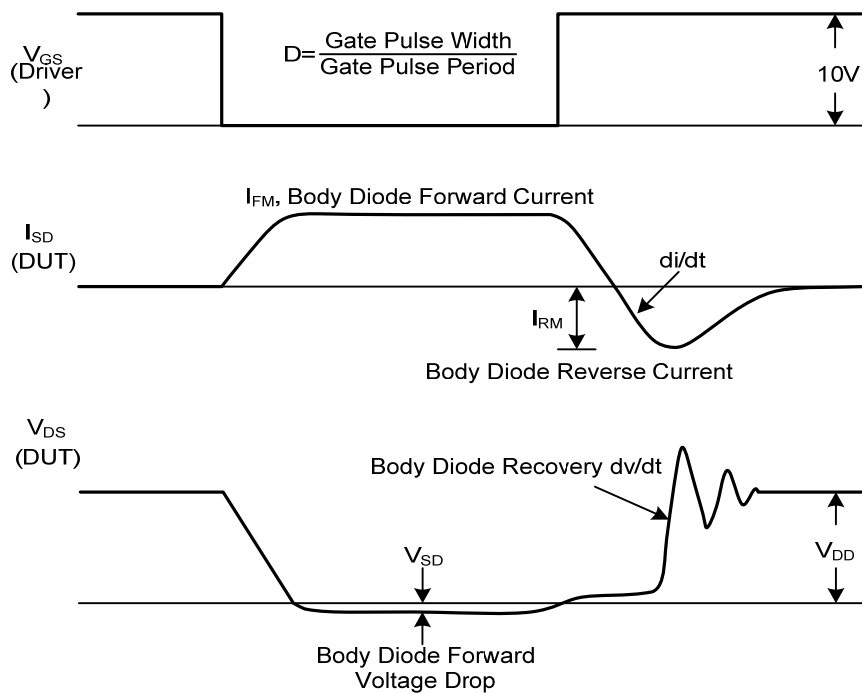
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

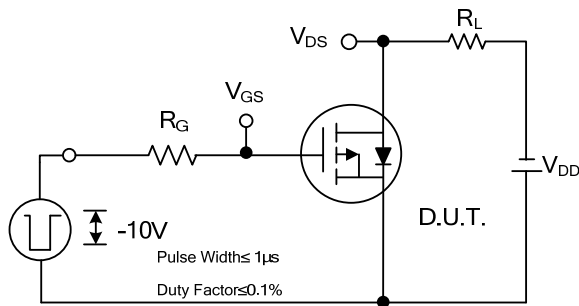


Peak Diode Recovery dv/dt Test Circuit

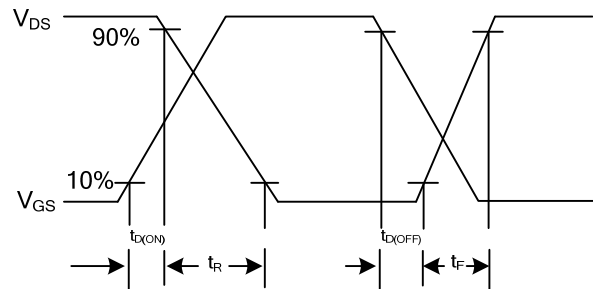


Peak Diode Recovery dv/dt Waveforms

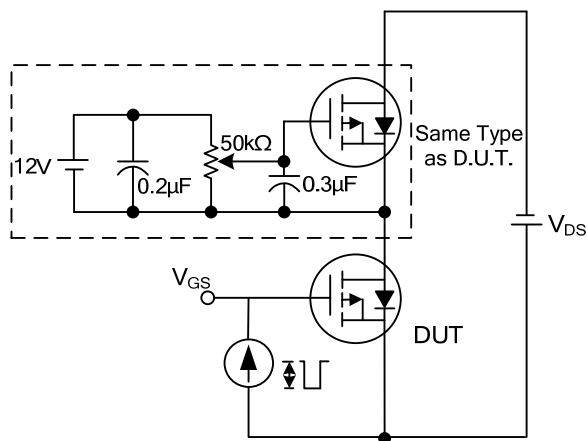
TEST CIRCUITS AND WAVEFORMS



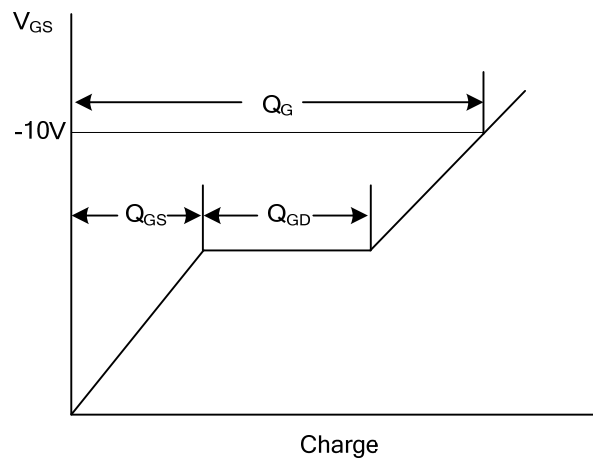
Switching Test Circuit



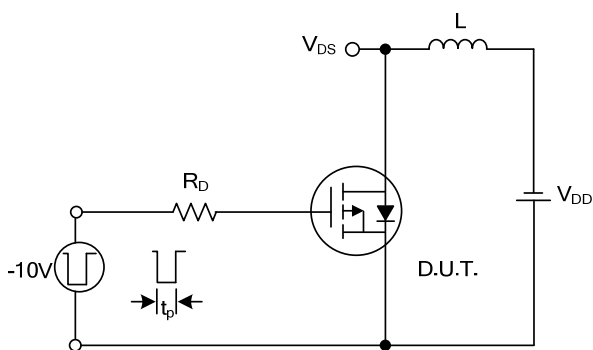
Switching Waveforms



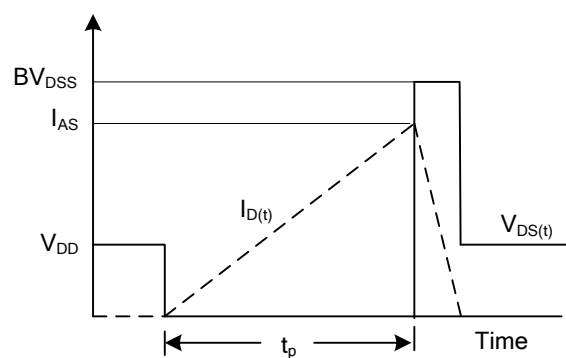
Gate Charge Test Circuit



Gate Charge Waveform

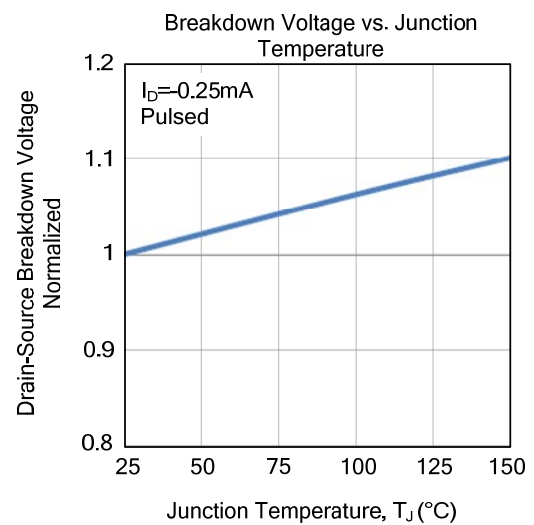
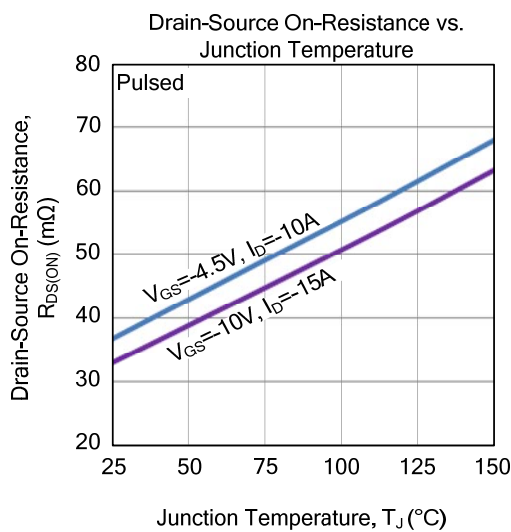
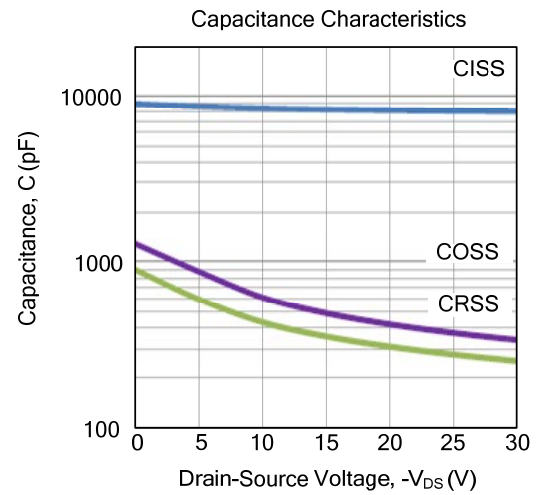
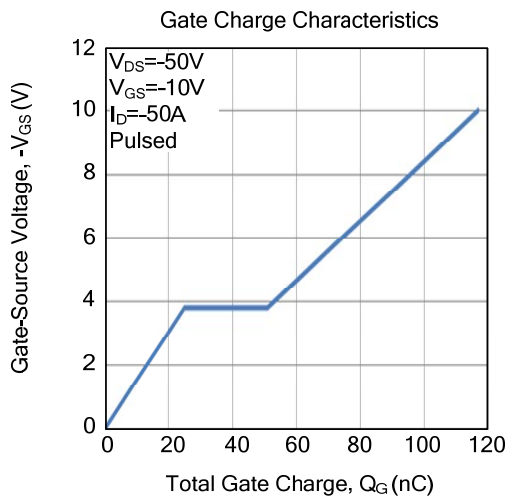
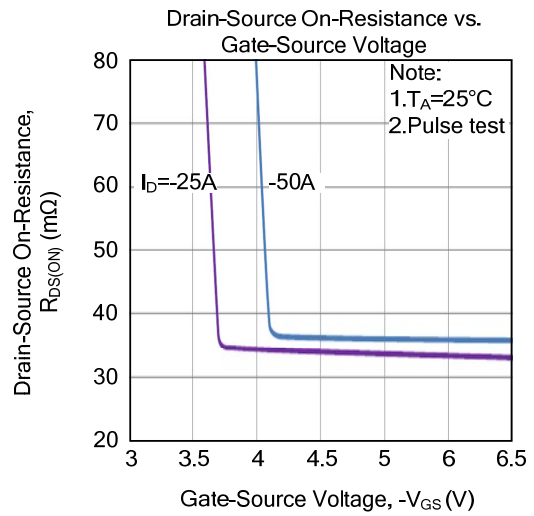
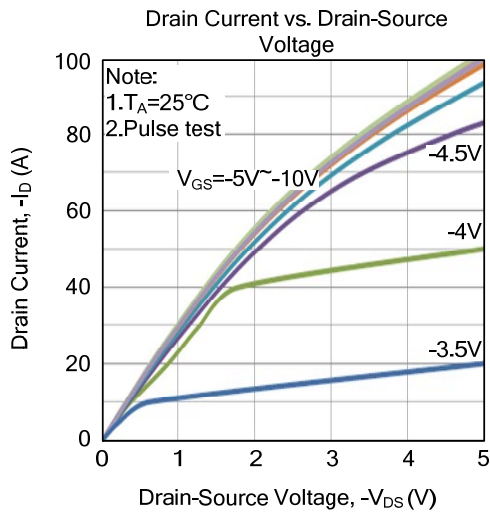


Unclamped Inductive Switching Test Circuit

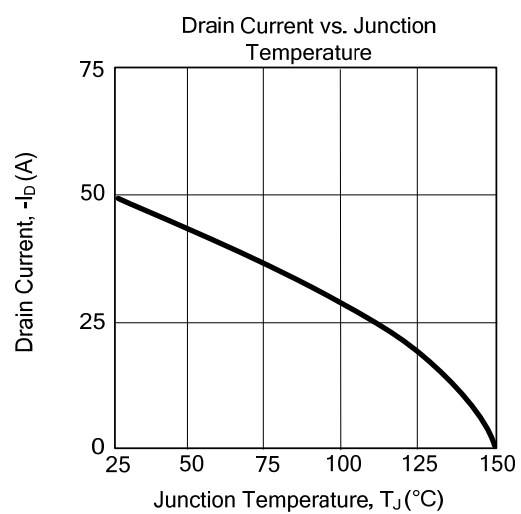
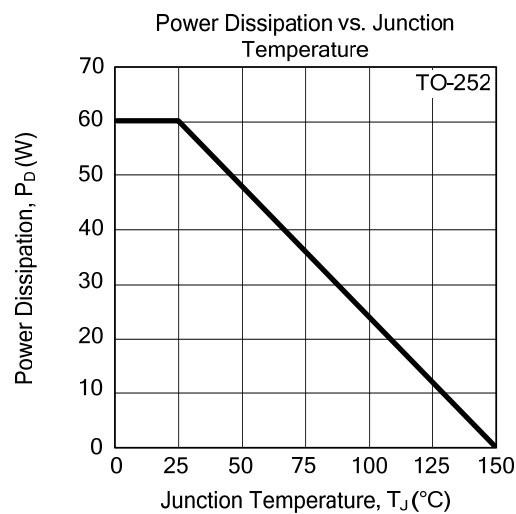
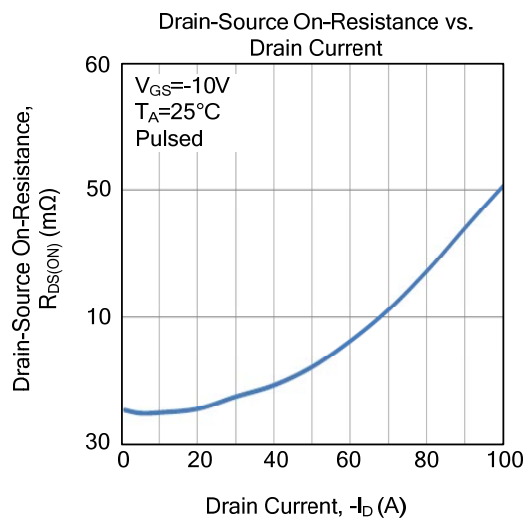
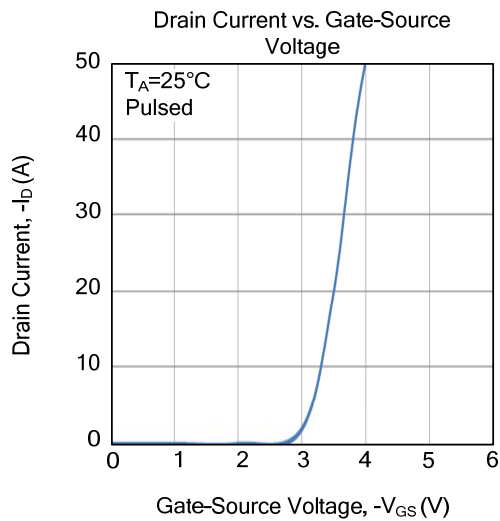
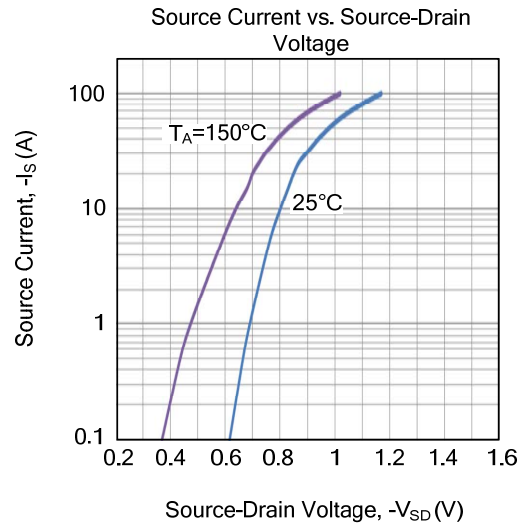
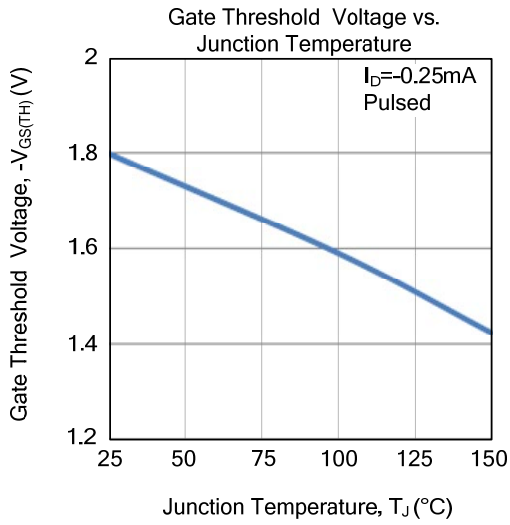


Unclamped Inductive Switching Waveforms

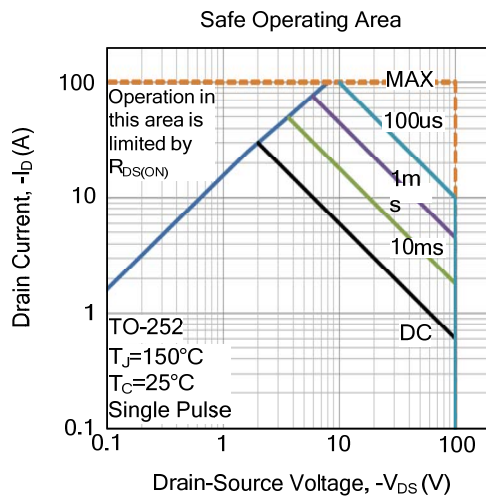
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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