



# UTT60N10

Power MOSFET

## 60A, 100V N-CHANNEL ENHANCEMENT MODE POWER MOSFET TRANSISTOR

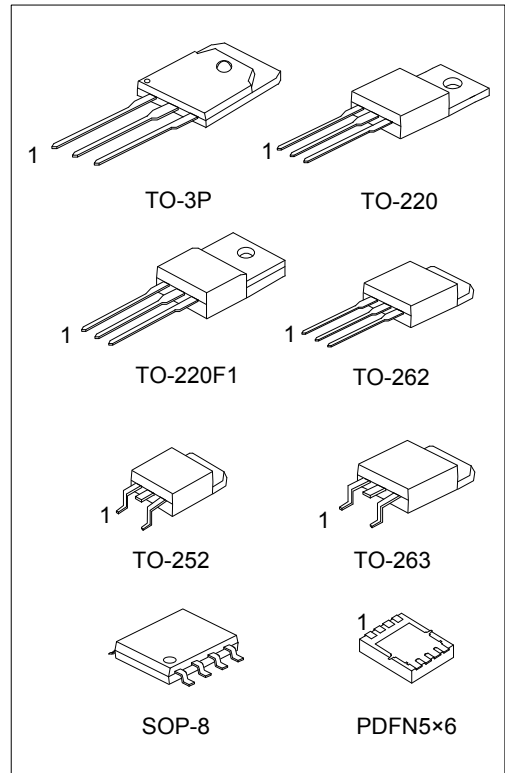
### DESCRIPTION

The UTC **UTT60N10** is an N-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect  $R_{DS(ON)}$ , high switching speed, high current capacity and low gate charge.

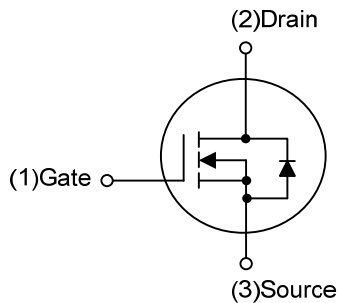
The UTC **UTT60N10** is suitable for motor control, DC-DC converters and audio amplifiers, etc.

### FEATURES

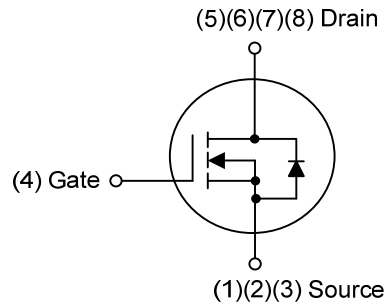
- \*  $R_{DS(ON)} \leq 24 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=30\text{A}$
- \* High Switching Speed
- \* High Current Capacity



### SYMBOL



TO-220/TO-220F1/TO-252  
TO-262/TO-263/TO-3P



SOP-8/PDFN5x6

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT60N10L-TA3-T	UTT60N10G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT60N10L-TF1-T	UTT60N10G-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	Tube
UTT60N10L-TN3-R	UTT60N10G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT60N10L-T3P-T	UTT60N10G-T3P-T	TO-3P	G	D	S	-	-	-	-	-	Tube
UTT60N10L-T2Q-T	UTT60N10G-T2Q-T	TO-262	G	D	S	-	-	-	-	-	Tube
UTT60N10L-TQ2-T	UTT60N10G-TQ2-T	TO-263	G	D	S	-	-	-	-	-	Tube
UTT60N10L-TQ2-R	UTT60N10G-TQ2-R	TO-263	G	D	S	-	-	-	-	-	Tape Reel
UTT60N10L-S08-R	UTT60N10G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTT60N10L-P5060-R	UTT60N10G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UTT60N10G-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TN3: TO-252 T3P: TO-3P, T2Q: TO-262, TQ2: TO-263, S08: SOP-8, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

PACKAGE	MARKING
TO-220 / TO-220F1 TO-252 / TO-262 TO-263 / TO-3P	<p>UTC UTT60N10 Lot Code → Date Code</p> <p>1</p> <p>L: Lead Free G: Halogen Free</p>
SOP-8	<p>8 7 6 5 UTC UTT60N10 Lot Code → Date Code</p> <p>1 2 3 4</p> <p>L: Lead Free G: Halogen Free</p>
PDFN5×6	<p>UTC UTT 60N10 Lot Code → Date Code</p>

■ 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		$V_{GSS}$	$\pm 20$	V	
Drain Current	Continuous	$I_D$	60	A	
	Pulsed	$I_{DM}$	100	A	
Avalanche Energy (Note 3)		Single Pulsed	$E_{AS}$	206	mJ
Power Dissipation	TO-220/TO-262 TO-263	$P_D$	125	W	
	TO-220F1		30	W	
	TO-252		50	W	
	TO-3P		320	W	
	SOP-8		6	W	
	PDFN5x6		14	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.  $L=0.5\text{mH}$ ,  $I_{AS}=28.7\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1 TO-262/TO-263	$\theta_{JA}$	62.5	$^\circ\text{C/W}$
	TO-252		110	$^\circ\text{C/W}$
	TO-3P		30	$^\circ\text{C/W}$
	SOP-8		90	$^\circ\text{C/W}$
	PDFN5x6		65	$^\circ\text{C/W}$
	Junction to Case		TO-220/TO-262 TO-263	$\theta_{JC}$
TO-220F1		4.17	$^\circ\text{C/W}$	
TO-252		2.5	$^\circ\text{C/W}$	
TO-3P		0.39	$^\circ\text{C/W}$	
SOP-8		20.8	$^\circ\text{C/W}$	
PDFN5x6		8.93	$^\circ\text{C/W}$	

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

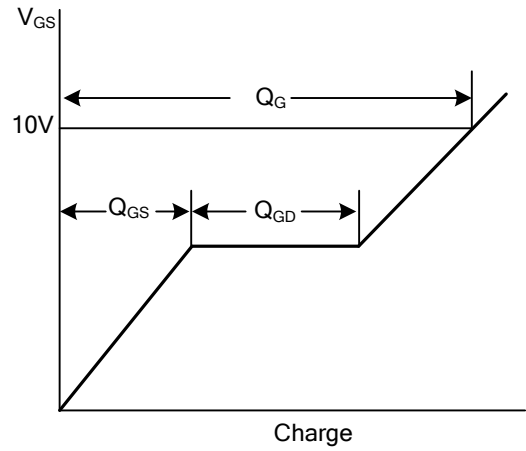
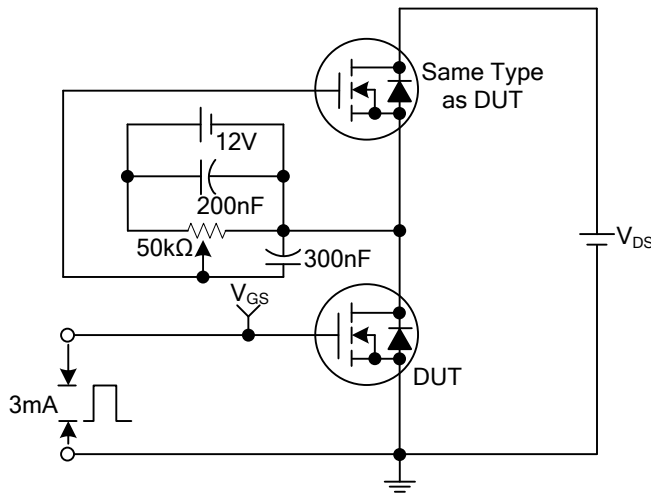
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

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	100			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V			1	μA
Gate- Source Leakage Current	Forward	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	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	2.0		4.0	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A			24	mΩ
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		5780		pF
Output Capacitance	C <sub>OSS</sub>			310		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			190		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =80V, V <sub>GS</sub> =10V, I <sub>D</sub> =60A (Note 1, 2)		110		nC
Gate to Source Charge	Q <sub>GS</sub>			20		nC
Gate to Drain Charge	Q <sub>GD</sub>			34		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =60A, R <sub>G</sub> =25Ω (Note 1, 2)		60		ns
Rise Time	t <sub>R</sub>			49.4		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			300.6		ns
Fall-Time	t <sub>F</sub>			125		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				60	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				100	A
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V			1.5	V
Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V,		57		ns
Reverse Recovery Charge	Q <sub>rr</sub>	dI/dt=100A/μs		254		nC

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

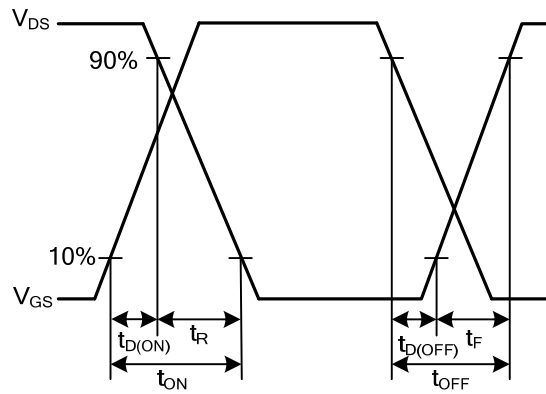
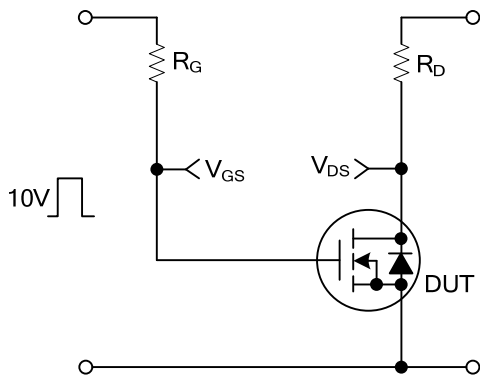
2. Essentially independent of operating temperature.

## TEST CIRCUITS AND WAVEFORMS



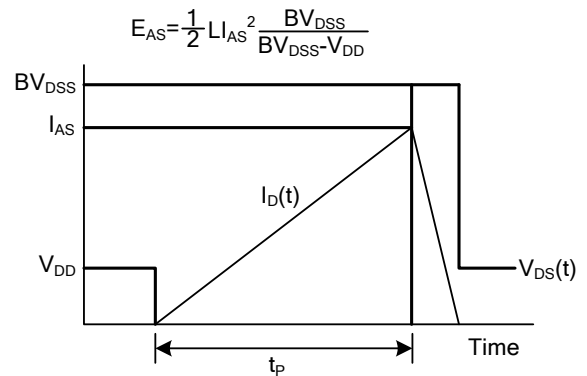
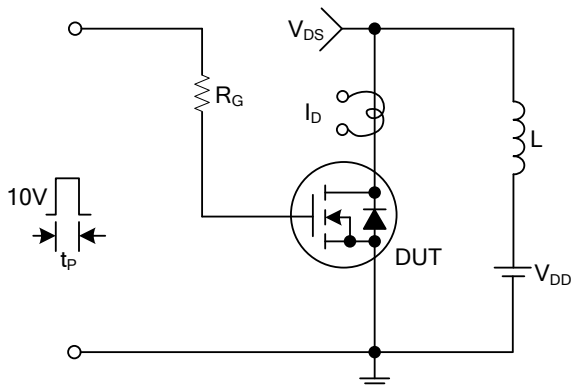
Gate Charge Test Circuit

Gate Charge Waveforms



Resistive Switching Test Circuit

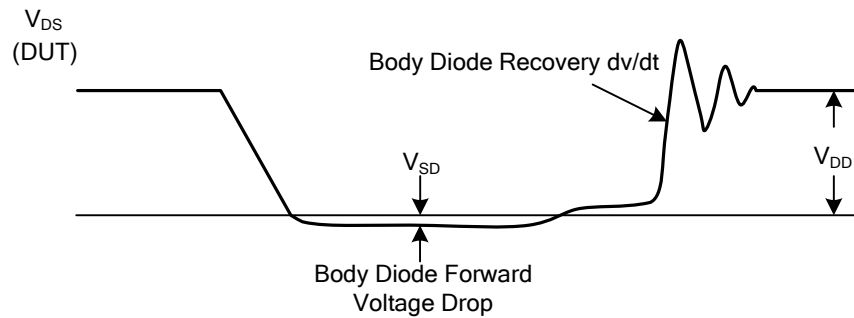
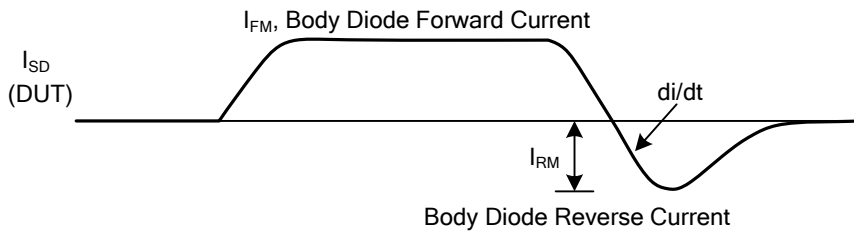
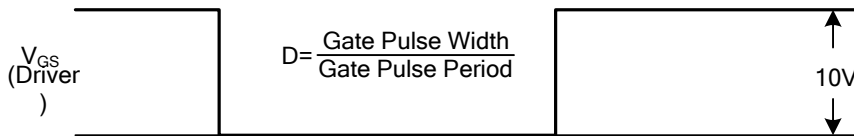
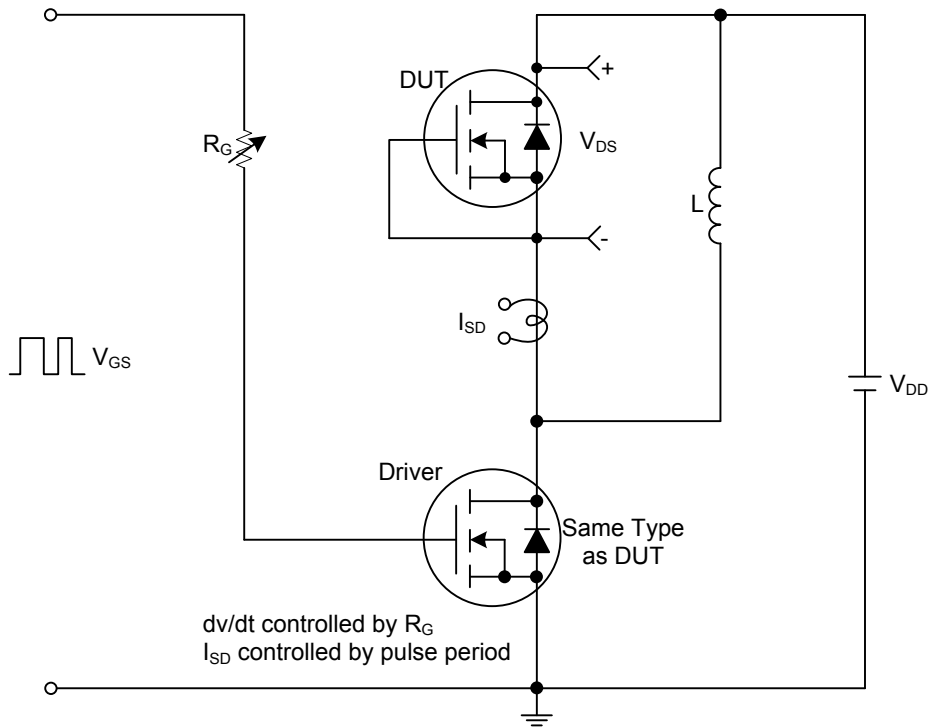
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

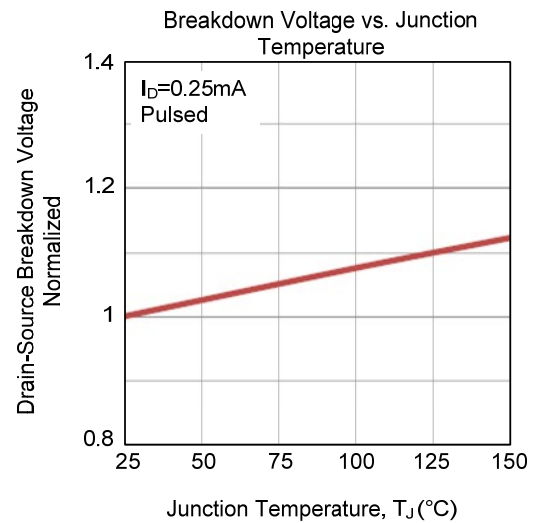
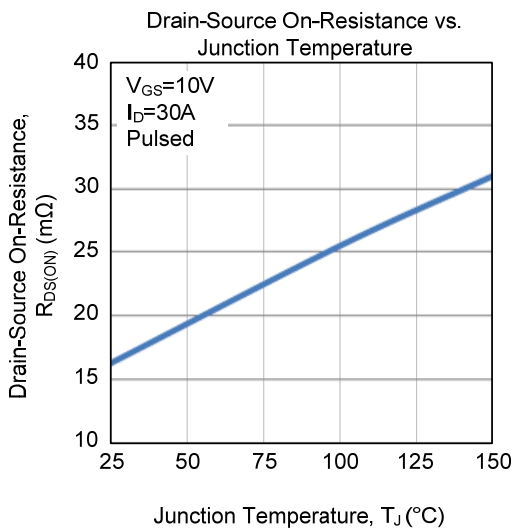
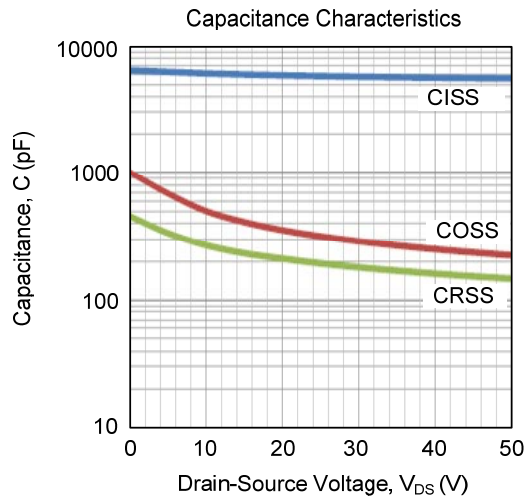
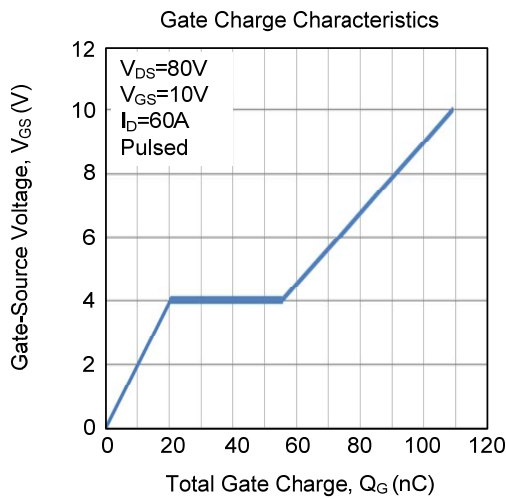
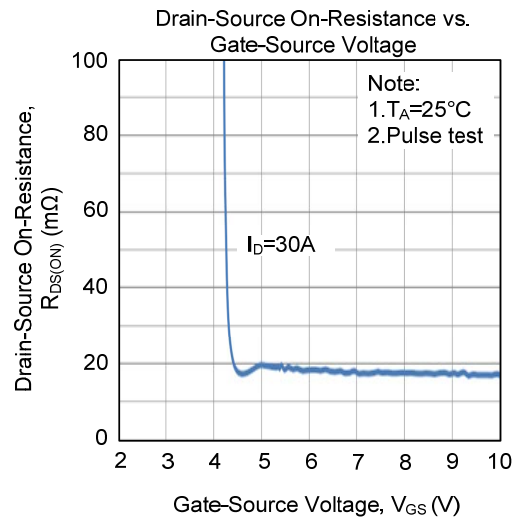
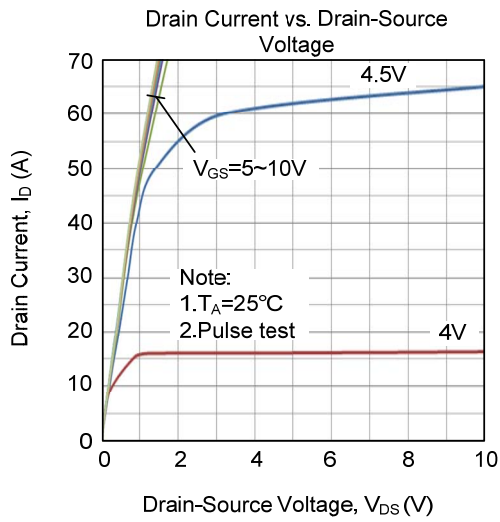
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS

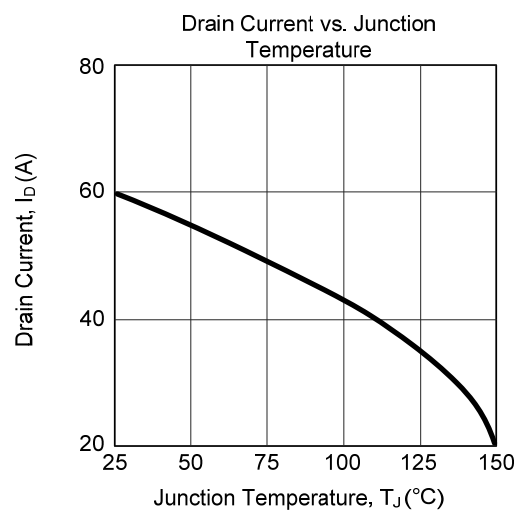
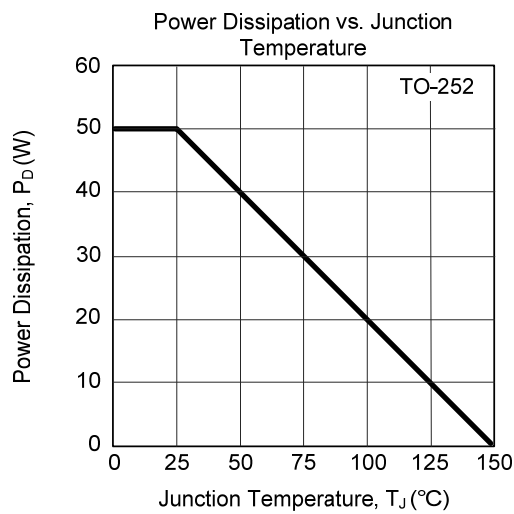
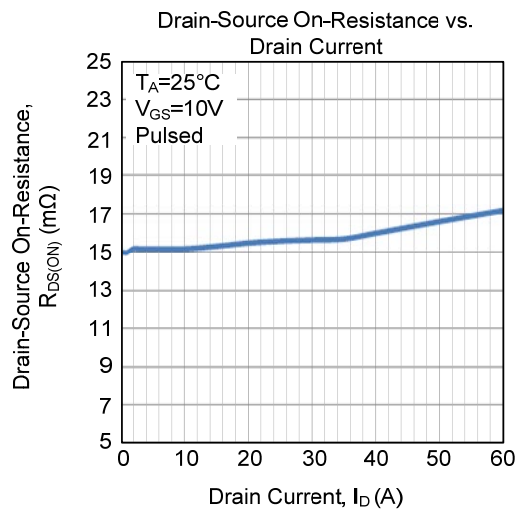
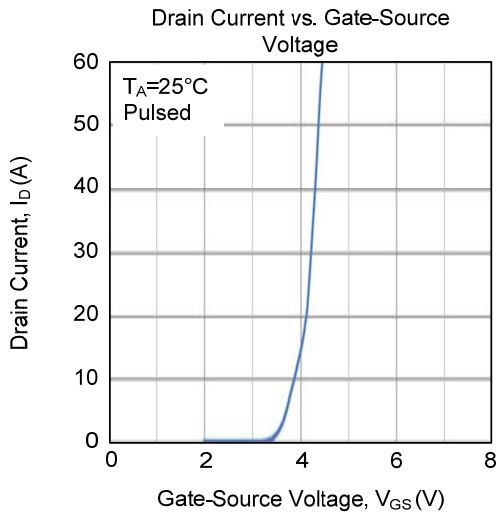
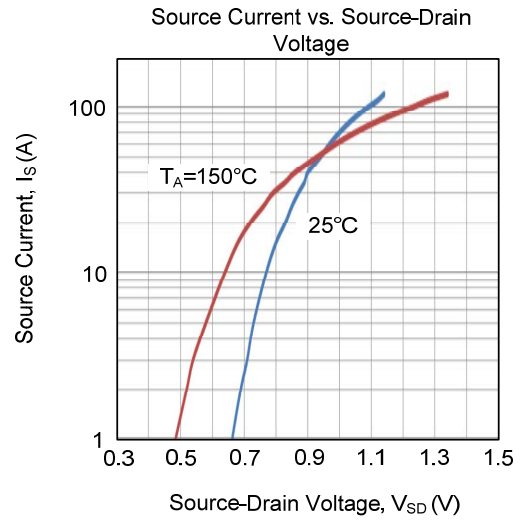
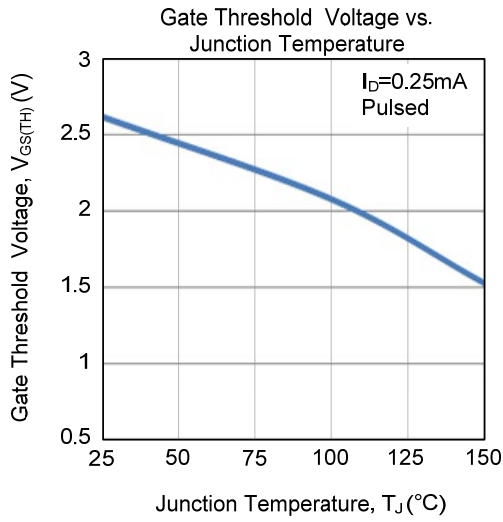


Peak Diode Recovery dv/dt Test Circuit and Waveforms

## TYPICAL CHARACTERISTICS

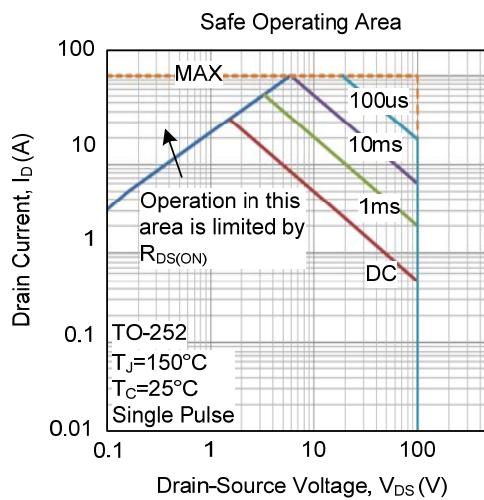


## TYPICAL CHARACTERISTICS (Cont.)





### ■ TYPICAL CHARACTERISTICS (Cont.)



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