



## UTT16P10

Power MOSFET

### -100V, -16A P-CHANNEL POWER MOSFET

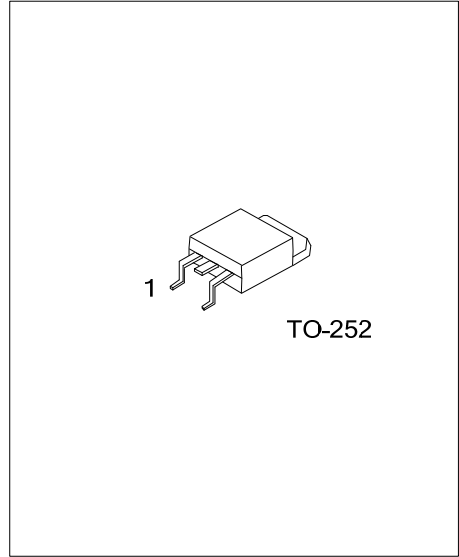
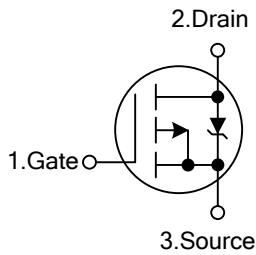
#### DESCRIPTION

The UTC **UTT16P10** is a P-channel power MOSFET using UTC's advanced technology to provide the customers with high switching speed, cost-effectiveness and a minimum on-state resistance. It can also withstand high energy in the avalanche.

#### FEATURES

- \*  $R_{DS(ON)} \leq 0.21 \Omega @ V_{GS}=-10V, I_D=-16A$
- \* High Switching Speed

#### SYMBOL



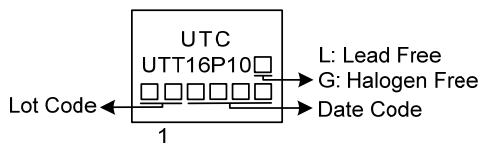
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTT16P10L-TN3-R	UTT16P10G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>UTT16P10G-TN3-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_J=25^\circ\text{C}$ , 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, $V_{GSS}@-10\text{V}$	$T_C=25^\circ\text{C}$	$I_D$	-16	A
		$T_C=100^\circ\text{C}$		-9.8	A
	Pulsed (Note 2)		$I_{DM}$	-30	A
Avalanche Energy	Repetitive (Note 3)		$E_{AS}$	60	mJ
Peak Diode Recovery dv/dt			dv/dt	-3.42	V/ns
Power Dissipation ( $T_C=25^\circ\text{C}$ )			$P_D$	45	W
Junction Temperature			$T_J$	-55 ~ +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 max. junction temperature.  
 3.  $V_{DD}=-25\text{V}$ , starting  $T_J=25^\circ\text{C}$ ,  $L=2.7\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AS}=-6.6\text{A}$ .

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	110	$^\circ\text{C/W}$
Junction to Case	$\theta_{JC}$	2.77	$^\circ\text{C/W}$

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

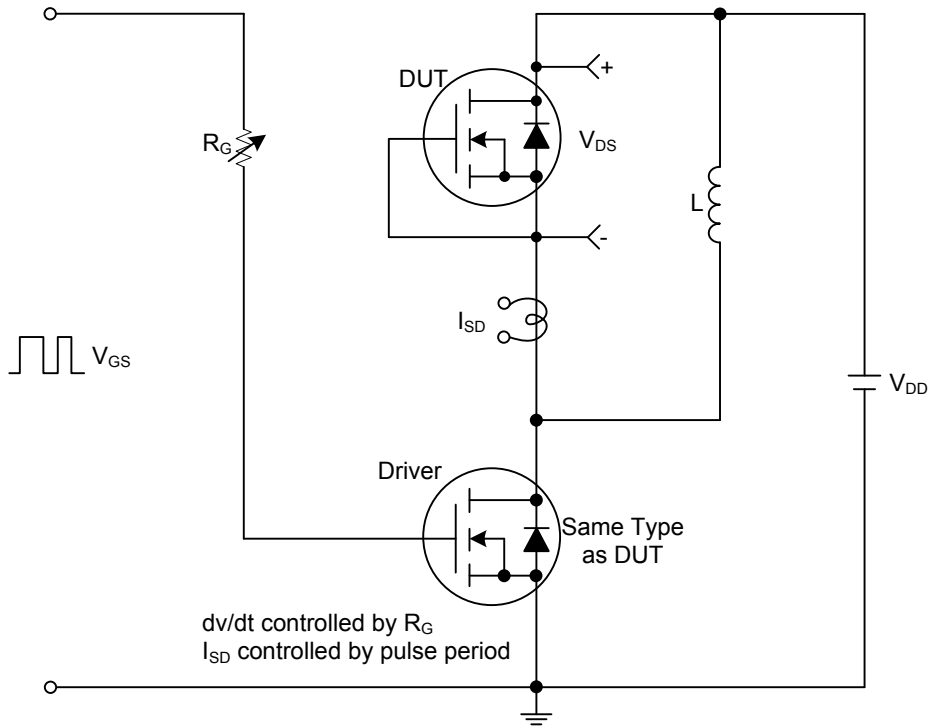
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

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
Breakdown Voltage Temperature Coefficient		ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =-1mA		-0.1		V/°C
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V,			-25	μA
			V <sub>DS</sub> =-80V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C			-100	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =+20V			+100	nA
	Reverse		V <sub>GS</sub> =-20V			-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		R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-16A (Note 2)			0.21	Ω
<b>DYNAMIC PARAMETERS</b>							
Input Capacitance		C <sub>ISS</sub>	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1.0MHz		1500	1900	pF
Output Capacitance		C <sub>OSS</sub>			82		pF
Reverse Transfer Capacitance		C <sub>RSS</sub>			68		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> =-16A		36	60	nC
Gate to Source Charge		Q <sub>GS</sub>			9.4		nC
Gate to Drain ("Miller") Charge		Q <sub>GD</sub>			6.4		nC
Turn-ON Delay Time		t <sub>D(ON)</sub>	V <sub>DD</sub> =-50V, I <sub>D</sub> =-16A, R <sub>G</sub> =9.1Ω		5.6		ns
Rise Time		t <sub>R</sub>			18		ns
Turn-OFF Delay Time		t <sub>D(OFF)</sub>			52		ns
Fall-Time		t <sub>F</sub>			25		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Maximum Body-Diode Continuous Current		I <sub>S</sub>				-16	A
Maximum Body-Diode Pulsed Current		I <sub>SM</sub>	(Note 1)			-30	A
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	I <sub>S</sub> =-16A, V <sub>GS</sub> =0V (Note 2)			-2.6	V
Body Diode Reverse Recovery Time (Note 1)		t <sub>rr</sub>	I <sub>S</sub> =-16A, V <sub>GS</sub> =0V,		244		ns
Body Diode Reverse Recovery Charge		Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs		2.44		μC

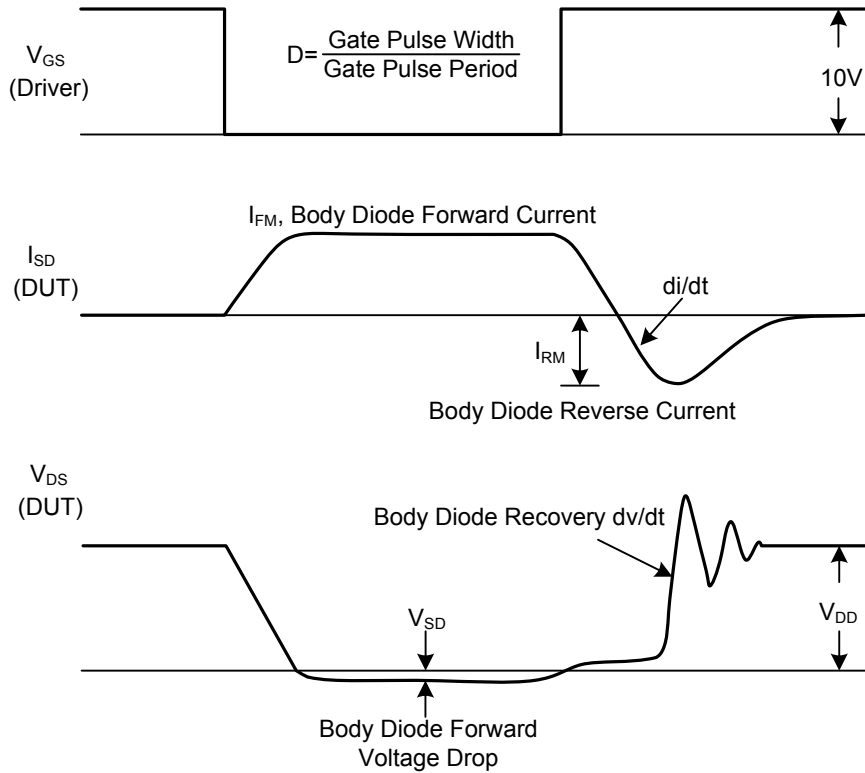
Notes: 1. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

2. Repetitive rating; pulse width limited by max. junction temperature.

■ TEST CIRCUITS AND WAVEFORMS



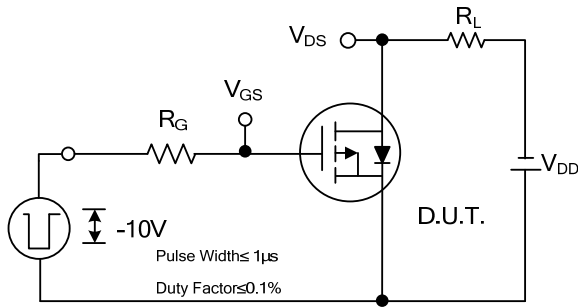
Peak Diode Recovery dv/dt Test Circuit



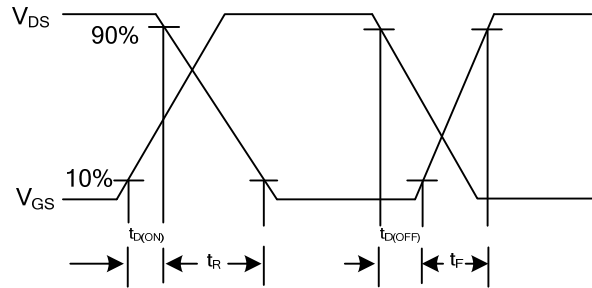
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

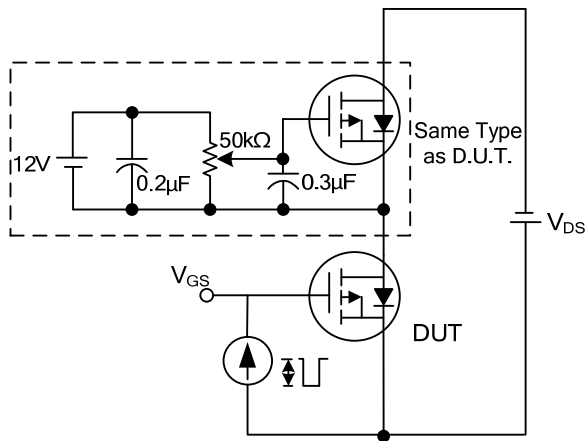
## TEST CIRCUITS AND WAVEFORMS



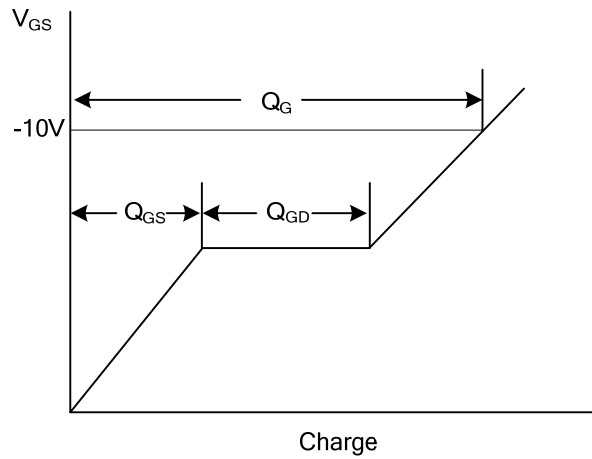
**Switching Test Circuit**



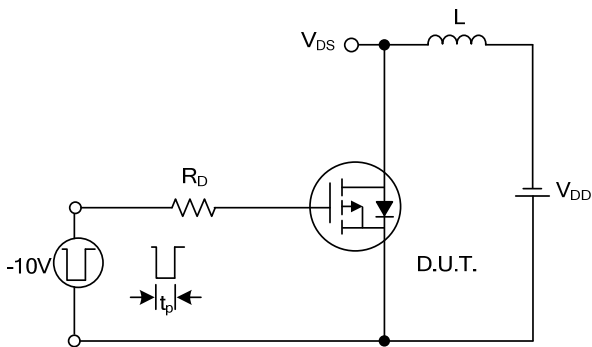
**Switching Waveforms**



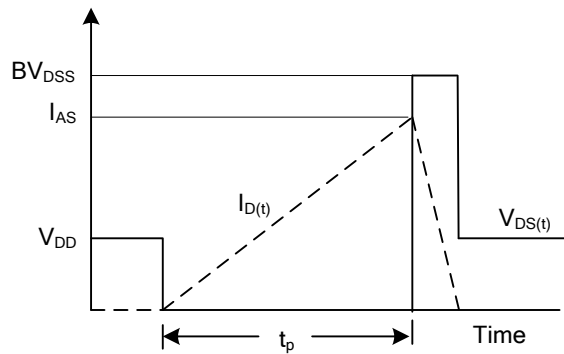
**Gate Charge Test Circuit**



**Gate Charge Waveform**

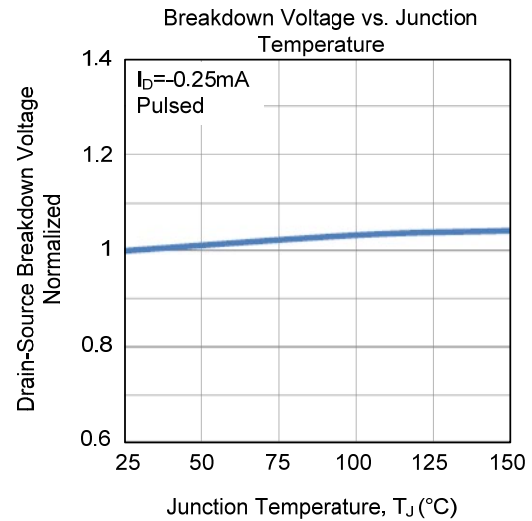
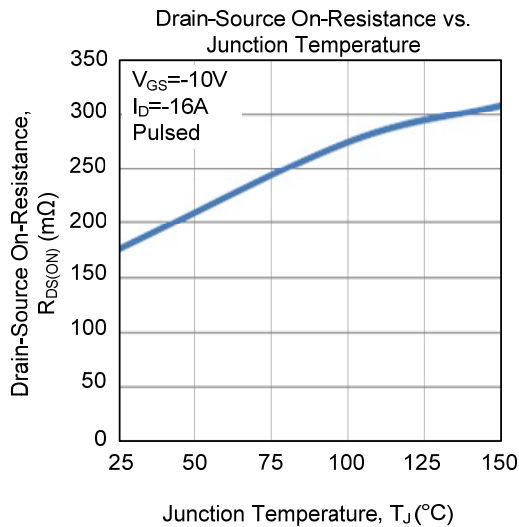
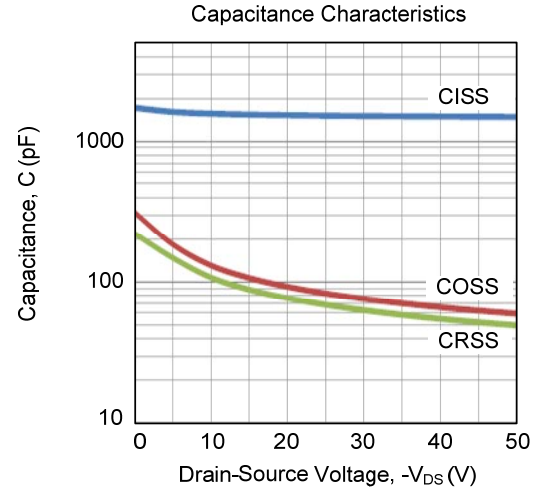
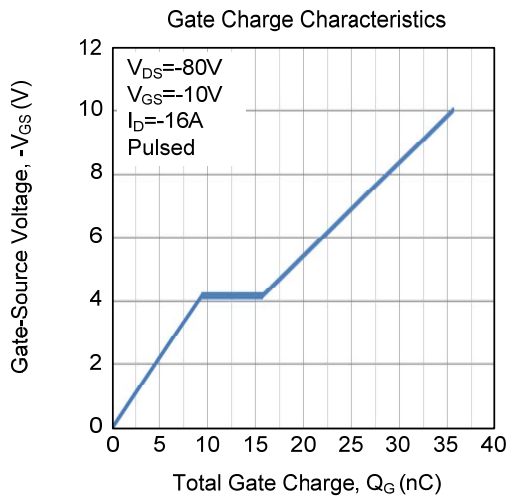
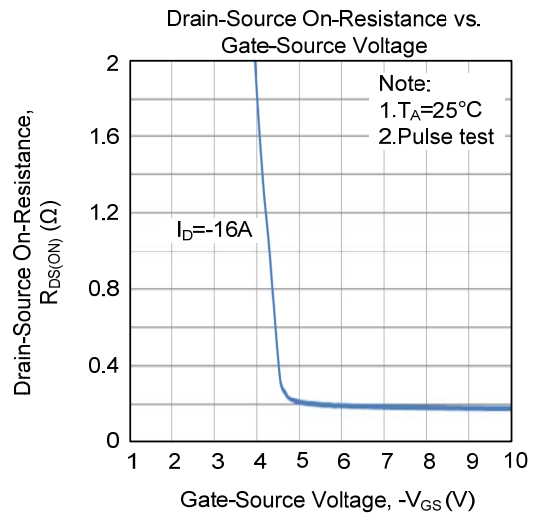
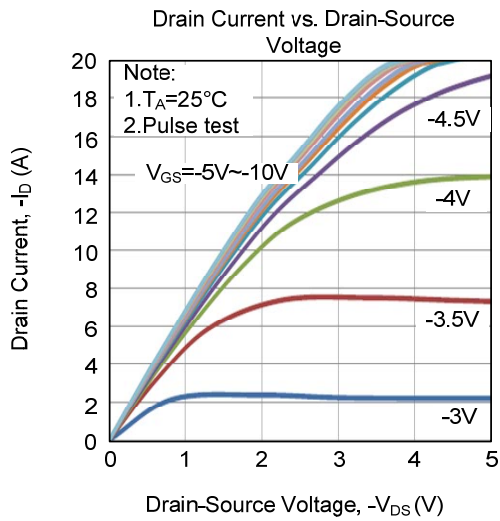


**Unclamped Inductive Switching Test Circuit**

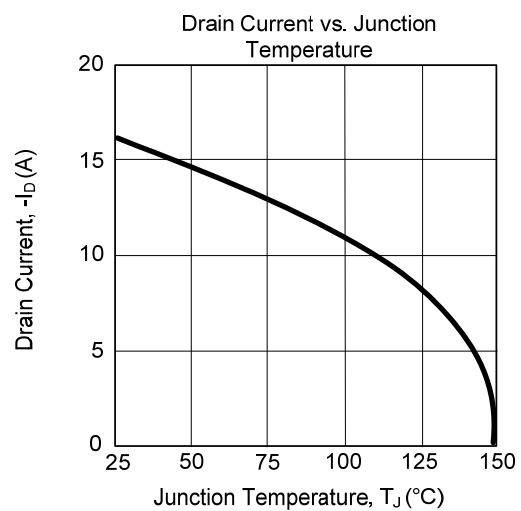
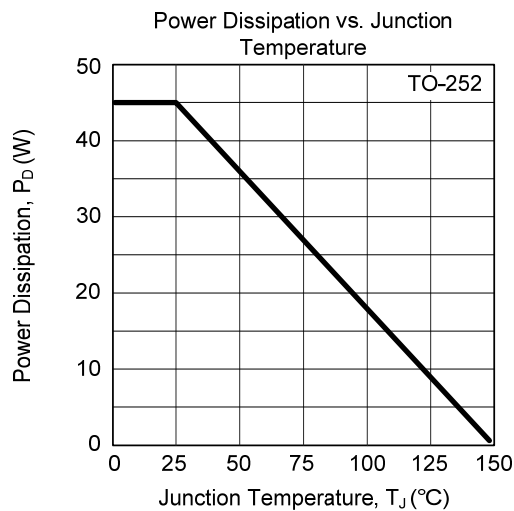
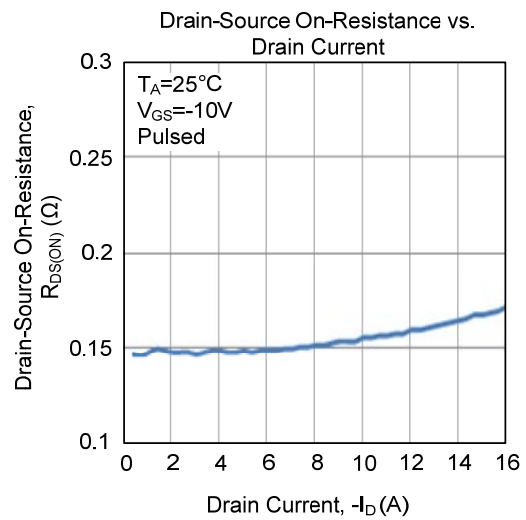
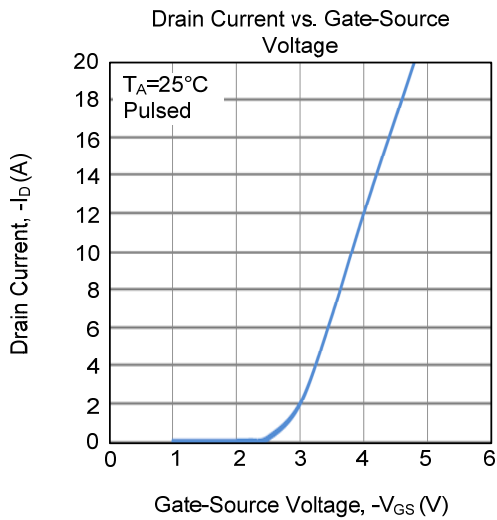
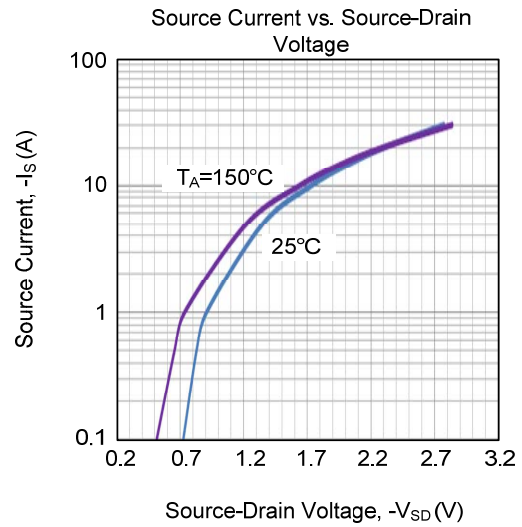
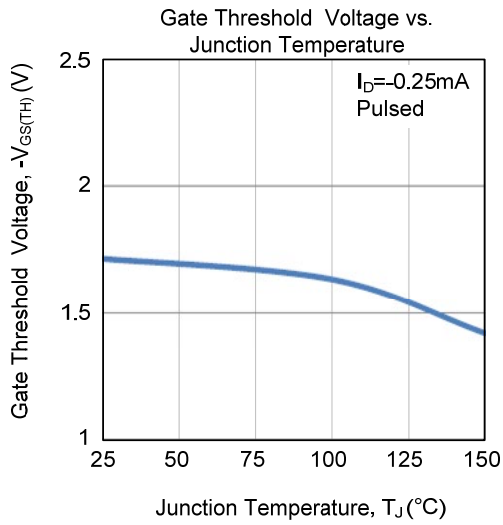


**Unclamped Inductive Switching Waveforms**

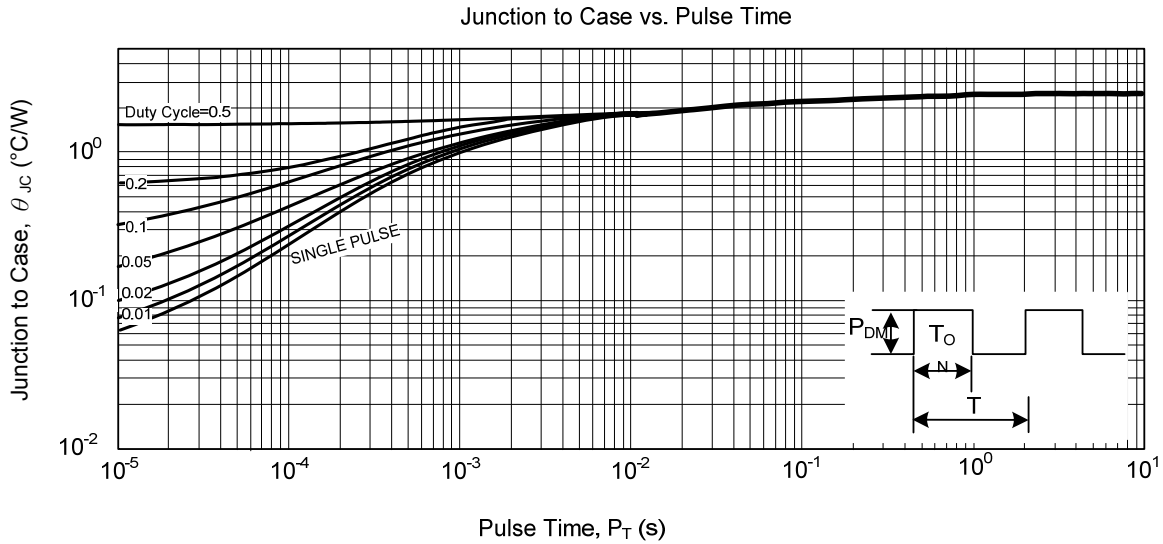
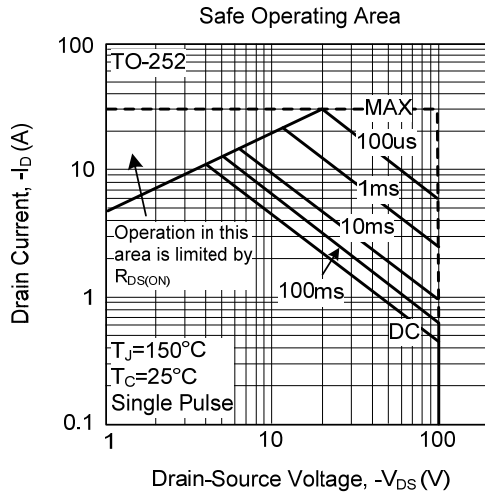
## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS (Cont.)



### ■ TYPICAL CHARACTERISTICS (Cont.)



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