



**UTT50P04**

**Power MOSFET**

**-40V, -50A P-CHANNEL  
POWER MOSFET**

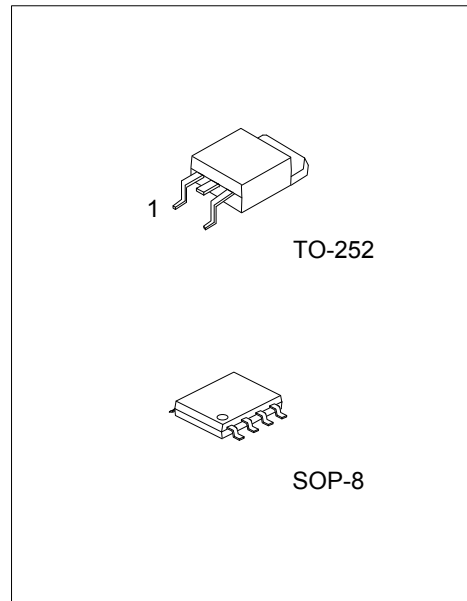
■ DESCRIPTION

The UTC **UTT50P04** 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, and it can also withstand high energy in the avalanche.

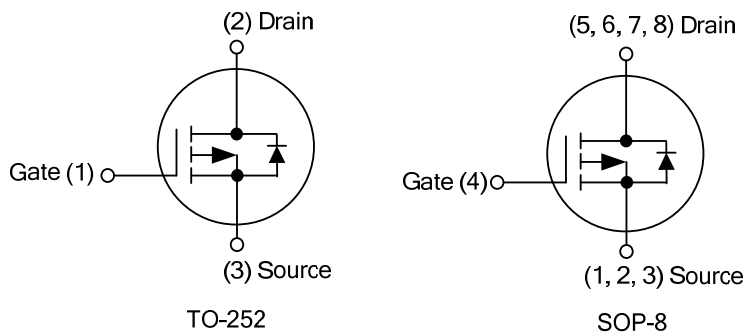
This UTC **UTT50P04** is suitable for motor drivers, high-side switch and 12V board net, etc.

■ FEATURES

- \*  $R_{DS(ON)} < 15m\Omega$  @  $V_{GS} = -10V, I_D = -30A$
- \* High Switching Speed



■ SYMBOL



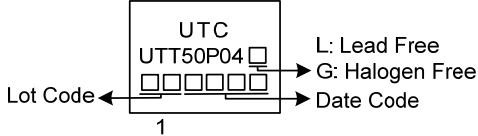
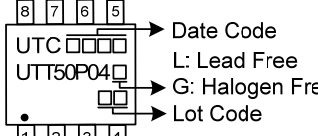
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT50P04L-TN3-R	UTT50P04G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT50P04L-S08-R	UTT50P04G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UTT50P04G-TN3-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) TN3: TO-252, S08: SOP-8</li> <li>(3) G: Halogen Free and Lead Free, L: Lead Free</li> </ul>
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MARKING

TO-252	SOP-8
 <p>Diagram of TO-252 marking: A rectangular package with 'UTC' and 'UTT50P04' printed on top. Below the part number are four small squares representing a date code. To the left, an arrow points to a square representing the lot code. To the right, three arrows point to 'L: Lead Free', 'G: Halogen Free', and 'Date Code'.</p>	 <p>Diagram of SOP-8 marking: An 8-pin package with 'UTC' and 'UTT50P04' printed on top. Above the part number are four squares representing a date code. Below the part number are four squares representing a lot code. To the right, three arrows point to 'Date Code', 'L: Lead Free', and 'G: Halogen Free'. Below the package, pins are numbered 1 through 4.</p>

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■ ABSOLUTE MAXIMUM RATINGS ( $T_c=25^\circ\text{C}$ , 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	$I_D$	-50 (Note 2)	A
	Pulsed	$I_{DM}$	-100	A
Continuous Source Current (Diode Conduction)		$I_S$	-50 (Note 2)	A
Avalanche Current		$I_{AR}$	-40	A
Avalanche Energy		$E_{AS}$	80	mJ
Power Dissipation	TO-252	$P_D$	50	W
	SOP-8		4.5	W
Junction Temperature		$T_J$	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Note: 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.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient (Note 1)	TO-252	$\theta_{JA}$	110	$^\circ\text{C}/\text{W}$
	SOP-8		100	$^\circ\text{C}/\text{W}$
Junction to Case	TO-252	$\theta_{JC}$	2.5	$^\circ\text{C}/\text{W}$
	SOP-8		27.8	$^\circ\text{C}/\text{W}$

Notes: 1. Surface Mounted on 1"x1" FR4 Board.

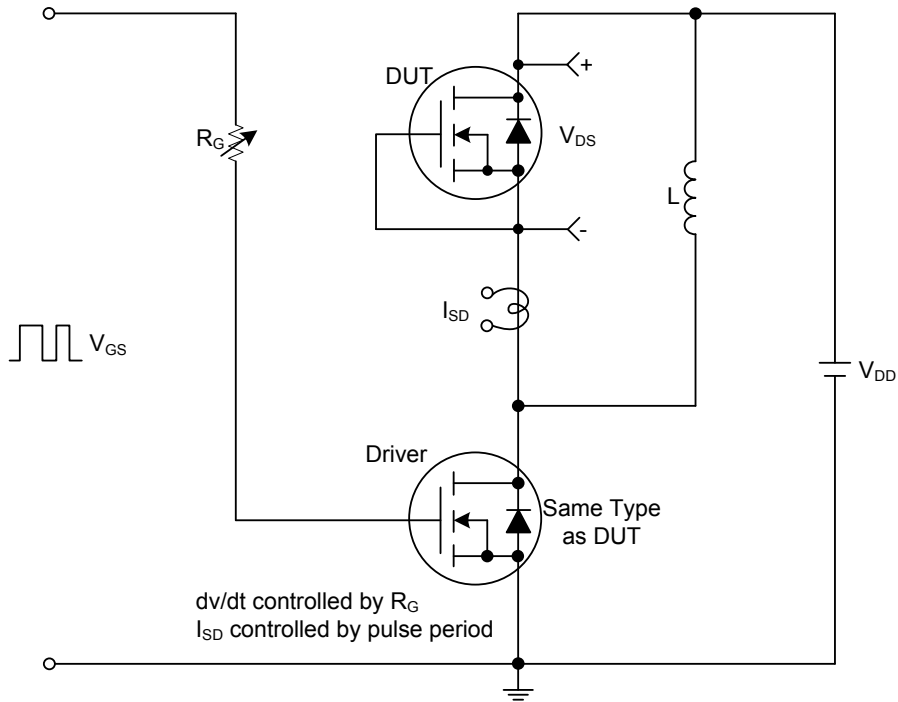
2. Calculated based on maximum allowable Junction Temperature. Package limitation current is 50A.

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

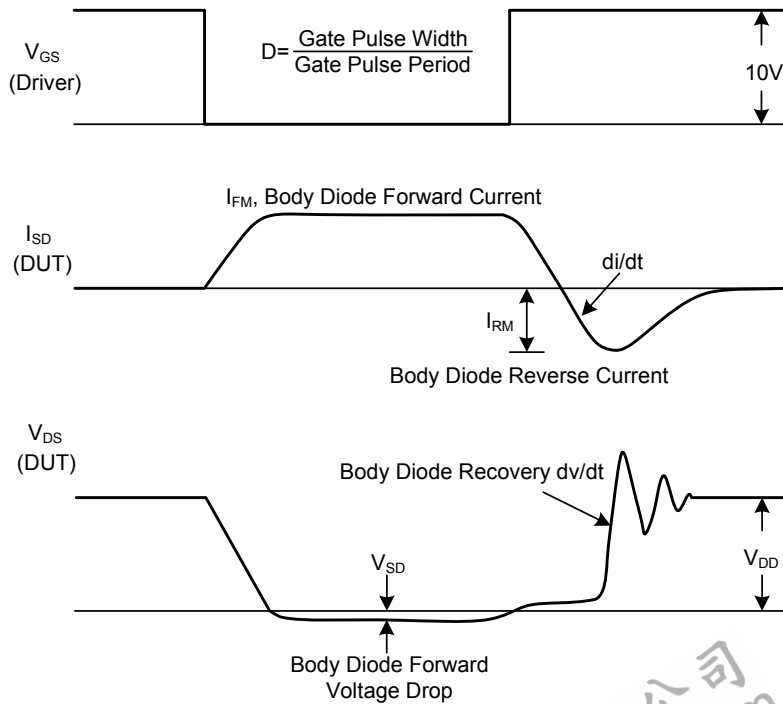
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-40			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-40V, V <sub>GS</sub> =0V			-1	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V		+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	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note 1)	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A			15	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A			25	mΩ
<b>DYNAMIC PARAMETERS (Note 2)</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz		3140		pF
Output Capacitance	C <sub>OSS</sub>			384		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			289		pF
<b>SWITCHING PARAMETERS (Note 2)</b>						
Total Gate Charge (Note 3)	Q <sub>G</sub>	V <sub>GS</sub> =-5V, V <sub>DS</sub> =-20V, I <sub>D</sub> =-50A		32.8		nC
		V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V, I <sub>D</sub> =-50A		62.6		nC
Gate to Source Charge (Note 3)	Q <sub>GS</sub>	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V, I <sub>D</sub> =-50A		20.2		nC
Gate to Drain Charge (Note 3)	Q <sub>GD</sub>			8.2		nC
Turn-ON Delay Time (Note 3)	t <sub>D(ON)</sub>	V <sub>DD</sub> =-20V, V <sub>GEN</sub> =-10V, I <sub>D</sub> ≈-50A, R <sub>L</sub> =0.4 Ω, R <sub>G</sub> =2.5Ω		15		ns
Rise Time (Note 3)	t <sub>R</sub>			18		ns
Turn-OFF Delay Time (Note 3)	t <sub>D(OFF)</sub>			60		ns
Fall-Time (Note 3)	t <sub>F</sub>			47		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS (T<sub>C</sub>=25°C)</b>						
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				-50	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>F</sub> =-50A, V <sub>GS</sub> =0V			-1.5	V

- Notes: 1. Pulse test; pulse width≤300μs, duty cycle≤2%.  
 2. Guaranteed by design, not subject to production testing.  
 3. Independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



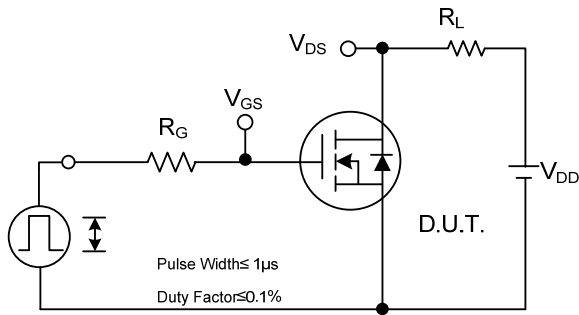
Peak Diode Recovery dv/dt Test Circuit



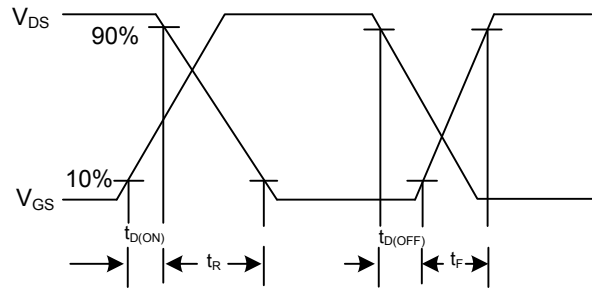
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

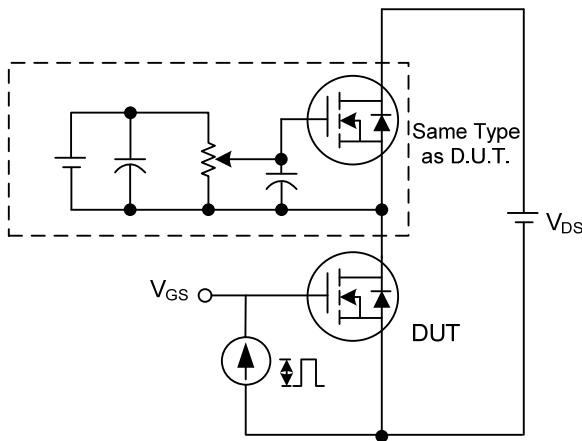
■ TEST CIRCUITS AND WAVEFORMS



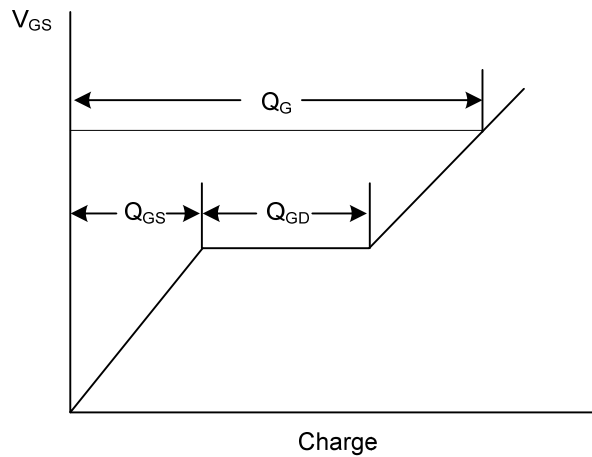
Switching Test Circuit



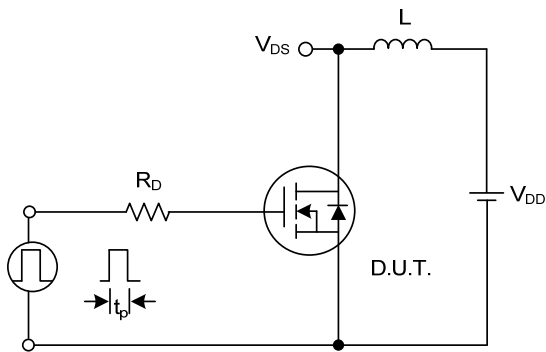
Switching Waveforms



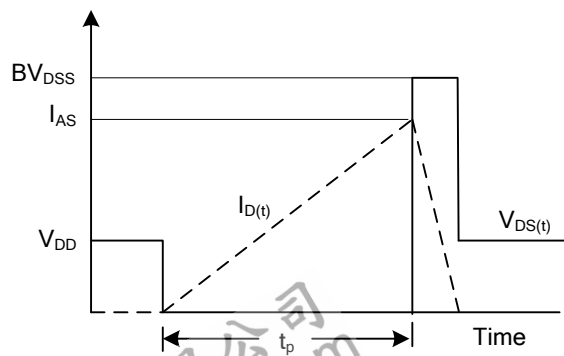
Gate Charge Test Circuit



Gate Charge Waveform

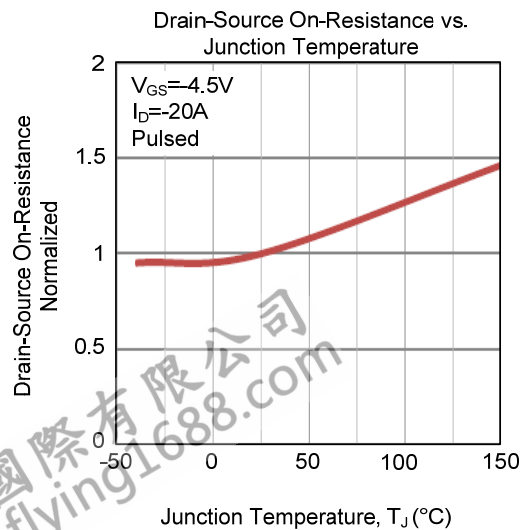
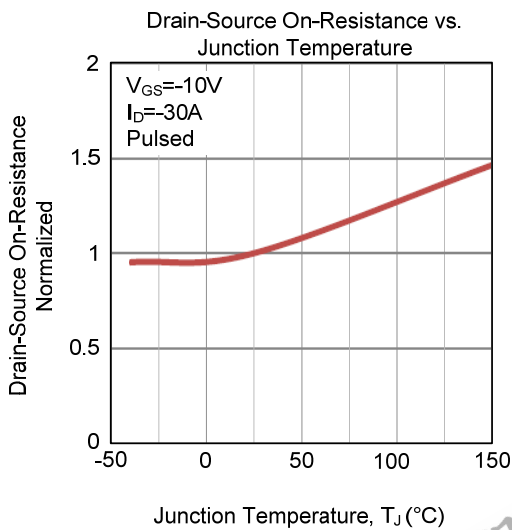
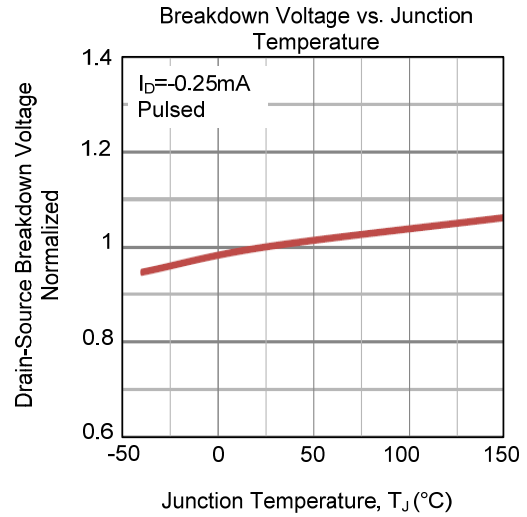
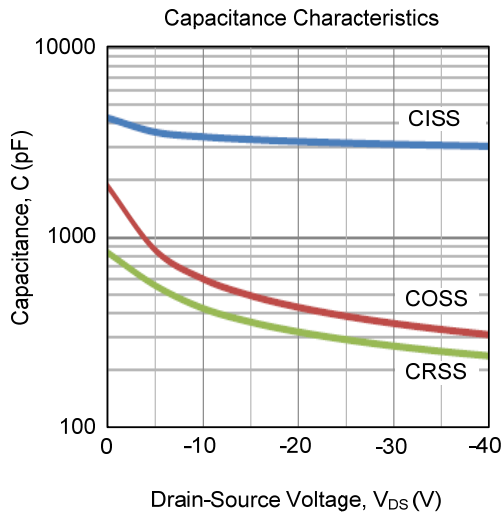
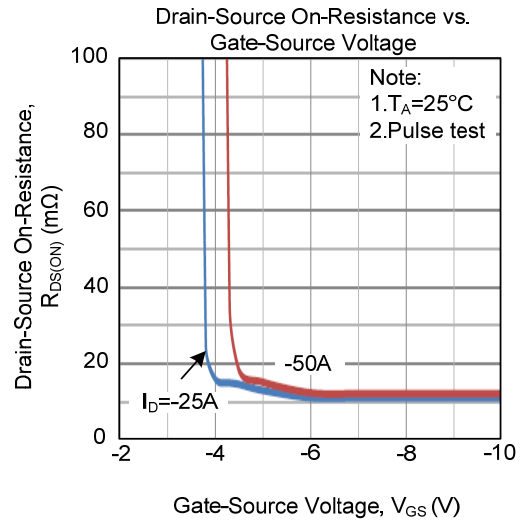
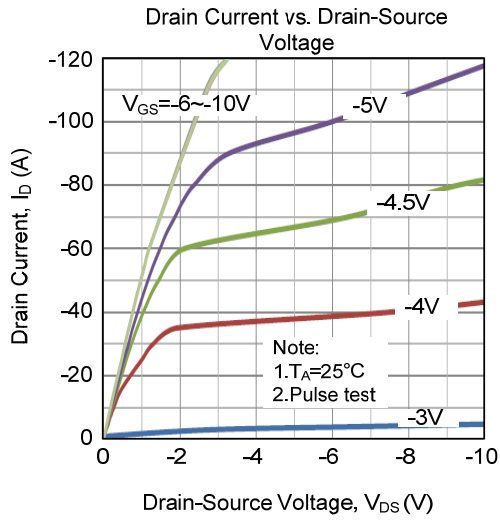


Unclamped Inductive Switching Test Circuit

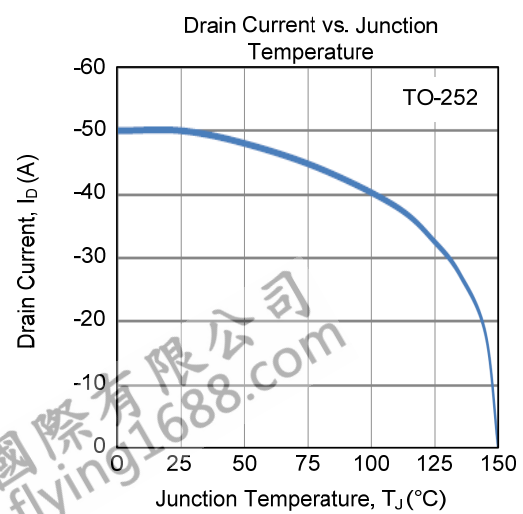
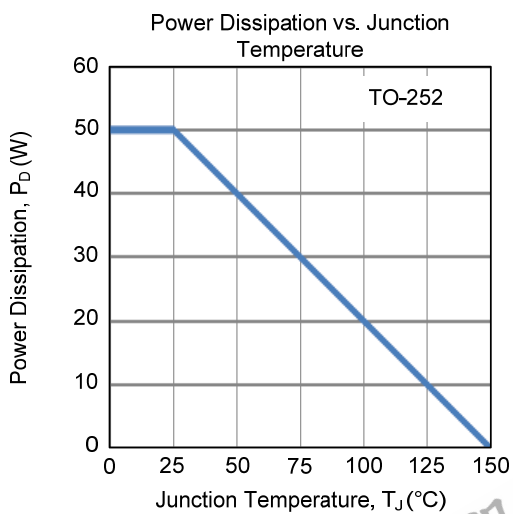
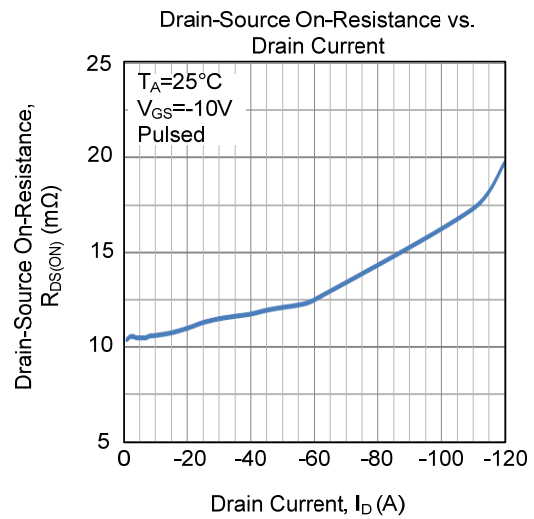
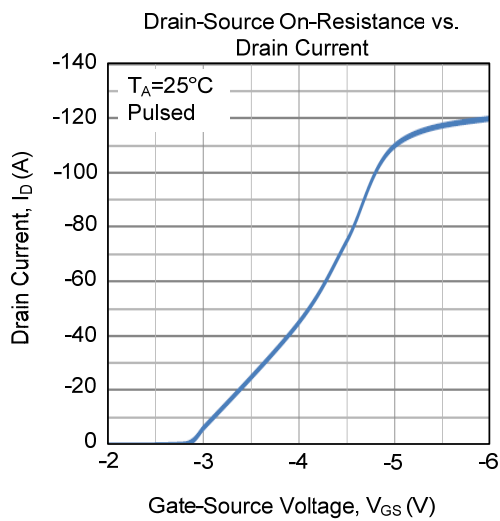
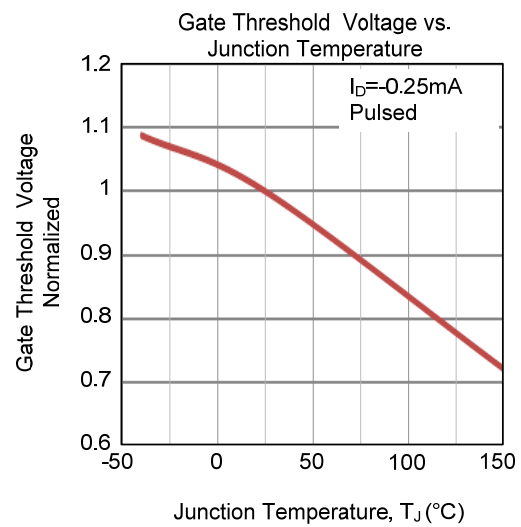
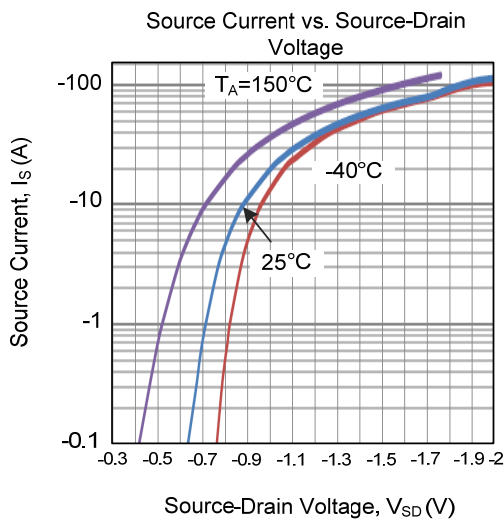


Unclamped Inductive Switching Waveforms

## TYPICAL CHARACTERISTICS

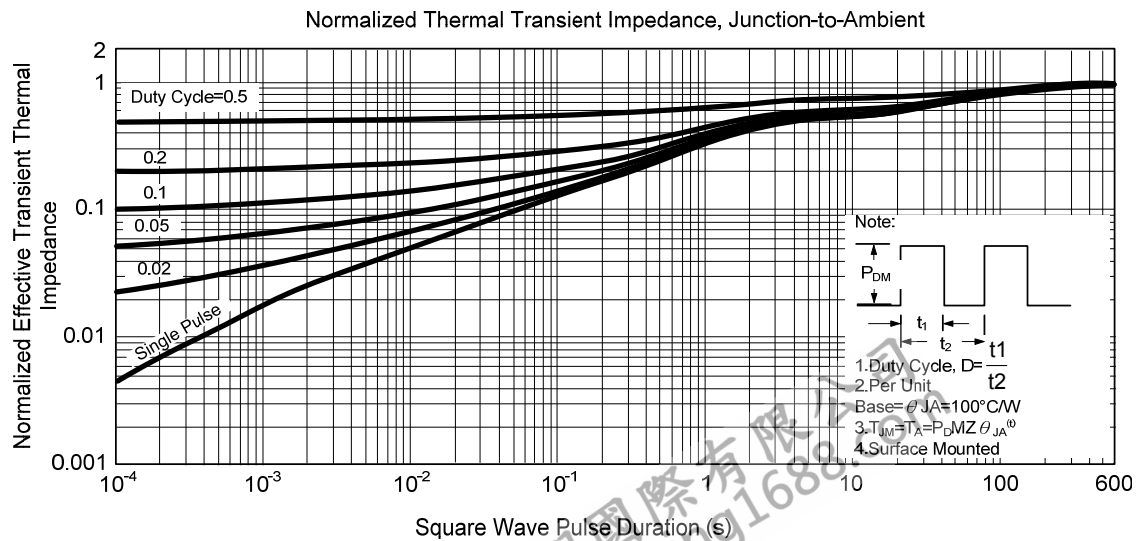
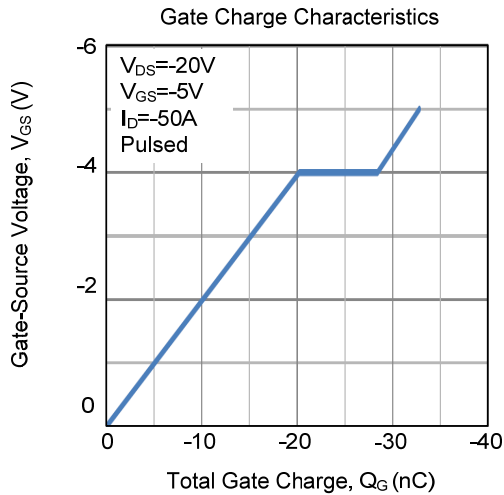
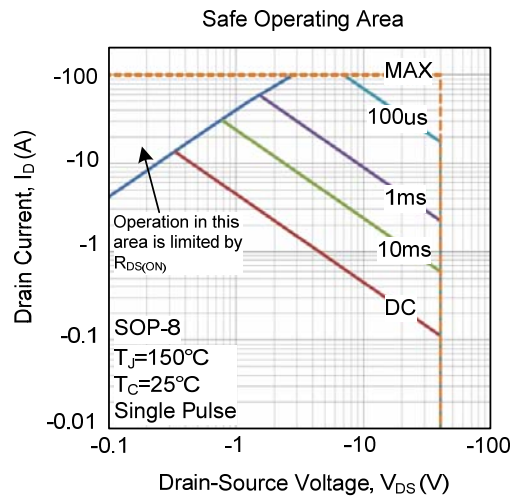
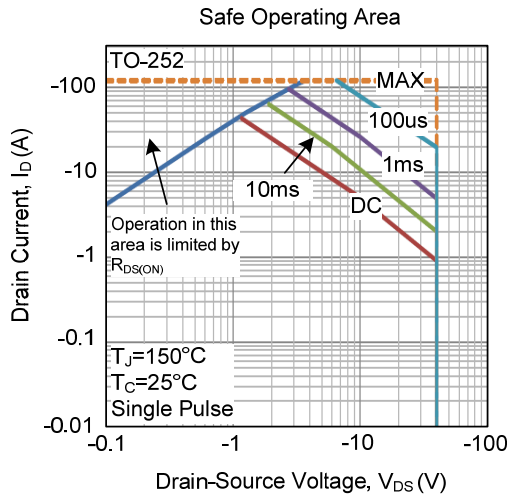


### TYPICAL CHARACTERISTICS (Cont.)





## ■ TYPICAL CHARACTERISTICS (Cont.)



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