



# UT70P03

*Power MOSFET*

## -70A, -30V P-CHANNEL POWER MOSFET

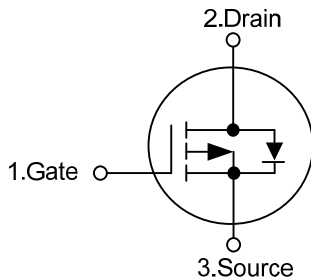
■ DESCRIPTION

The **UT70P03** uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

- \*  $R_{DS(ON)} \leq 10 \text{ m}\Omega$  @  $V_{GS}=-10\text{V}$ ,  $I_D=-35\text{A}$
- \*  $R_{DS(ON)} \leq 12 \text{ m}\Omega$  @  $V_{GS}=-4.5\text{V}$ ,  $I_D=-35\text{A}$
- \* Low Capacitance
- \* Low Gate Charge
- \* Fast Switching Capability
- \* Avalanche Energy Specified

■ SYMBOL

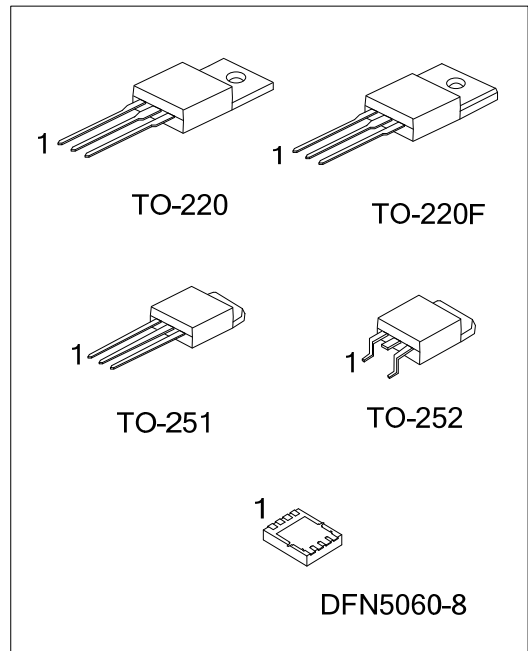


■ ORDERING INFORMATION

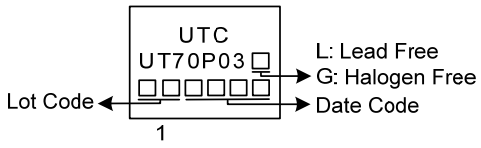
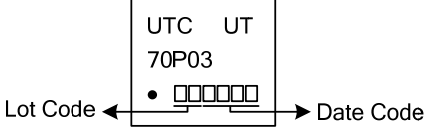
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT70P03L-TA3-T	UT70P03G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UT70P03L-TF3-T	UT70P03G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UT70P03L-TM3-T	UT70P03G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UT70P03L-TN3-R	UT70P03G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT70P03L-K08-5060-R	UT70P03G-K08-5060-R	DFN5060-8	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UT70P03G-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel                  (2) TA3: TO-220, TF3: TO-220F, TM3: TO-251                  TN3: TO-252, K08-5060: DFN5060-8                  (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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## MARKING

TO-220 / TO-220F / TO-251 / TO-252	DFN5060-8
 <p>UTC UT70P03 □ □ □ □ □ □ Lot Code ← → Date Code 1 L: Lead Free G: Halogen Free</p>	 <p>UTC UT 70P03 • □ □ □ □ □ Lot Code ← → Date Code</p>

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	-30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	$I_D$	-70	A
Pulsed Drain Current(Note 2)		$I_{DM}$	-140	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	224.2	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	21.7	V/ns
Power Dissipation ( $T_C=25^\circ\text{C}$ )	TO-220	$P_D$	147	W
	TO-220F		37	
	TO-251/ TO-252		65	
	DFN5060-8		13.6	
Junction Temperature		$T_J$	+175	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +175	$^\circ\text{C}$

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.  $L = 0.1\text{mH}$ ,  $I_{AS} = -66.9\text{A}$ ,  $V_{DD} = -30\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

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

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		110	
	DFN5060-8		65	
Junction to Case	TO-220	$\theta_{JC}$	0.85	$^\circ\text{C}/\text{W}$
	TO-220F		3.4	
	TO-251/TO-252		1.92 (Note)	
	DFN5060-8		9.1 (Note)	

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

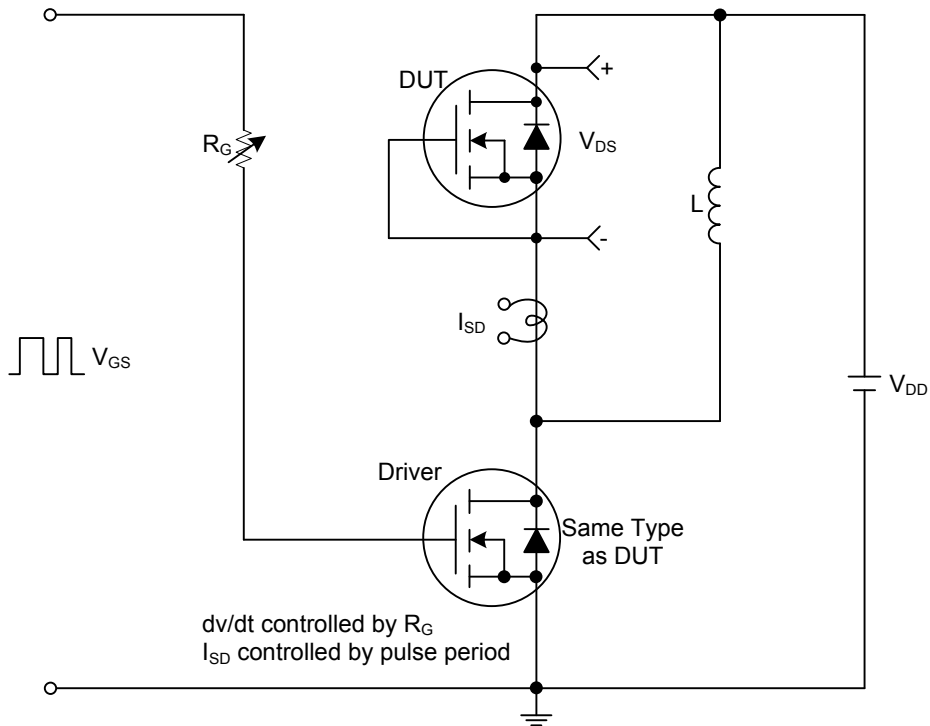
■ ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V, T_J=25^\circ\text{C}$			-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0		-3.0	V
Static Drain-Source On-Resistance (Note 2)	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-35A$			10	m $\Omega$
		$V_{GS}=-4.5V, I_D=-35A$			12	m $\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=-25V, V_{GS}=0V, f=1.0\text{MHz}$		5500		pF
Output Capacitance	$C_{OSS}$			911.3		pF
Reverse Transfer Capacitance	$C_{RSS}$			858.4		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge(Note 2)	$Q_G$	$V_{DS}=-24V, V_{GS}=-10V, I_D=-70A$ $I_G=1\text{mA}$ (Note 1, 2)		119		nC
Gate Source Charge	$Q_{GS}$			26		nC
Gate Drain ("Miller") Charge	$Q_{GD}$			24.8		nC
Turn-ON Delay Time(Note 2)	$t_{D(ON)}$	$V_{DS}=-15V, V_{GS}=-10V, I_D=-70A,$ $R_G=3.3\Omega$ (Note 1, 2)		15.8		ns
Turn-ON Rise Time	$t_R$			19.6		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			101		ns
Turn-OFF Fall-Time	$t_F$			67		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				-70	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				-140	A
Forward On Voltage(Note 2)	$V_{SD}$	$I_S=-70A, V_{GS}=0V$			-1.3	V
Reverse Recovery Time	$t_{rr}$	$I_S=-30A, V_{GS}=0V,$ $dI/dt=100\text{ A}/\mu\text{s}$		150		ns
Reverse Recovery Charge	$Q_{rr}$			928		nC

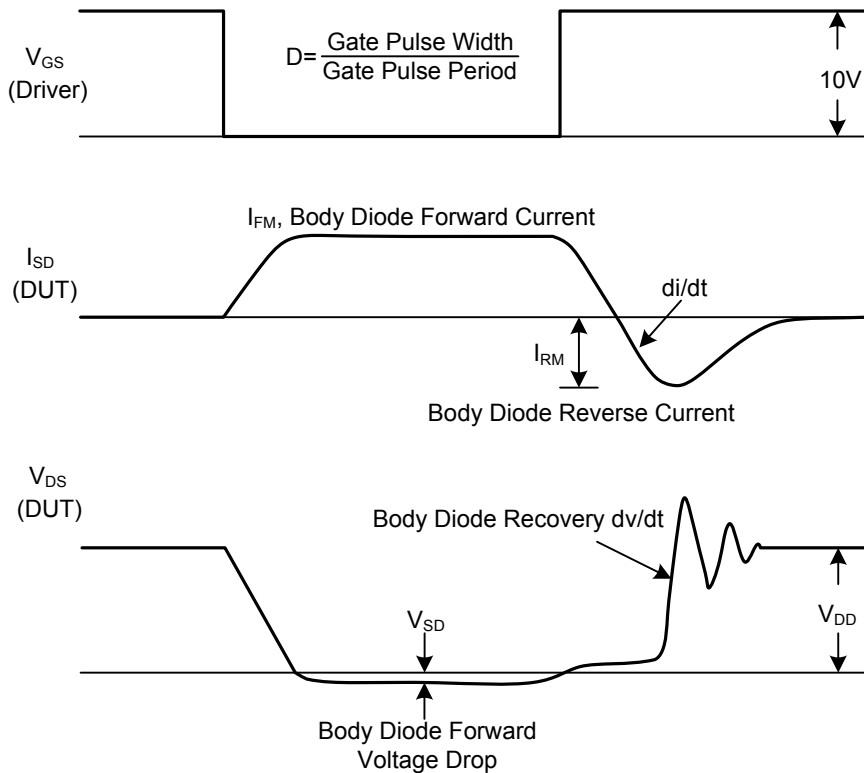
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



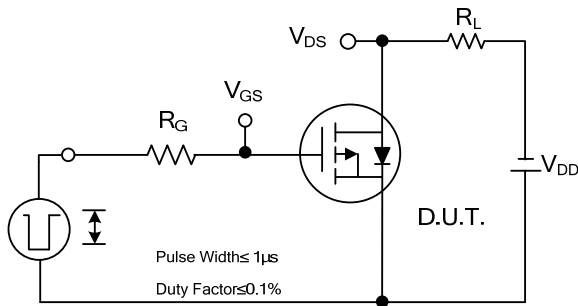
Peak Diode Recovery dv/dt Test Circuit



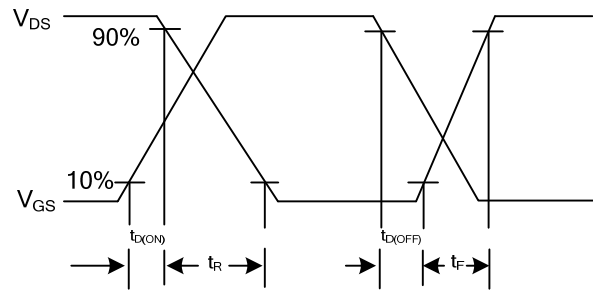
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

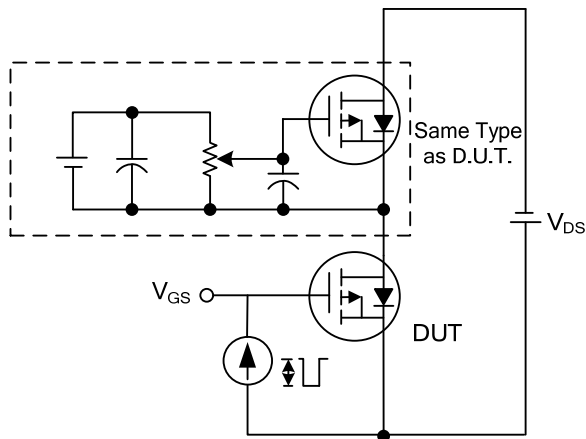
## TEST CIRCUITS AND WAVEFORMS



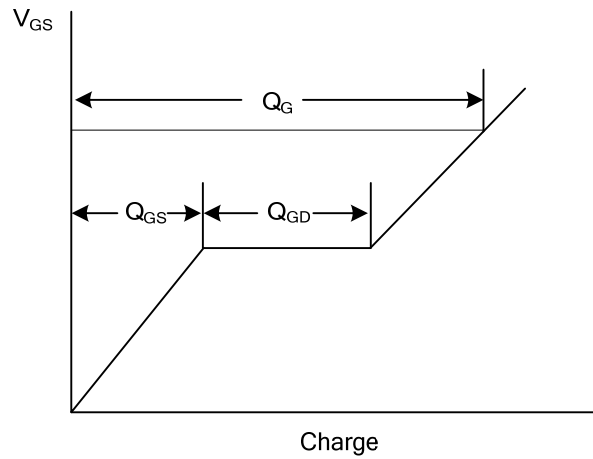
**Switching Test Circuit**



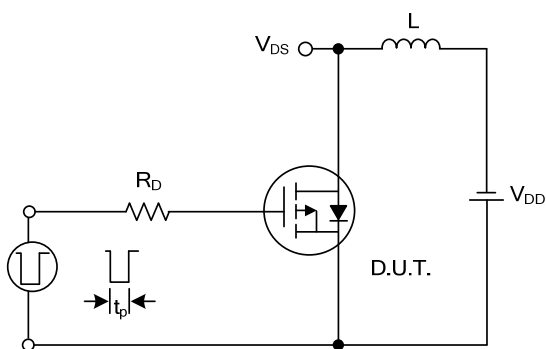
**Switching Waveforms**



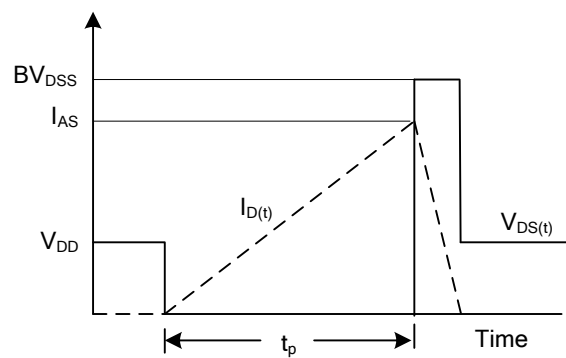
**Gate Charge Test Circuit**



**Gate Charge Waveform**

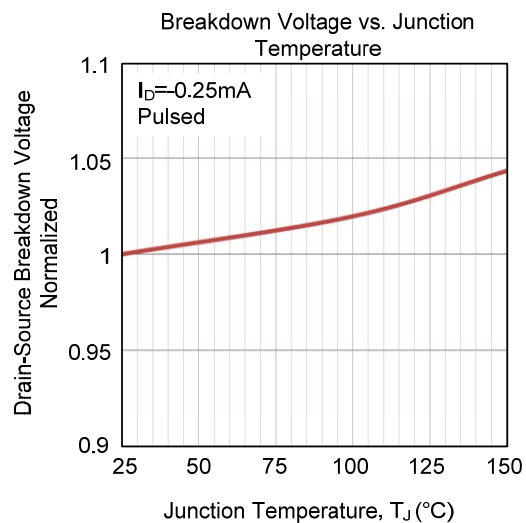
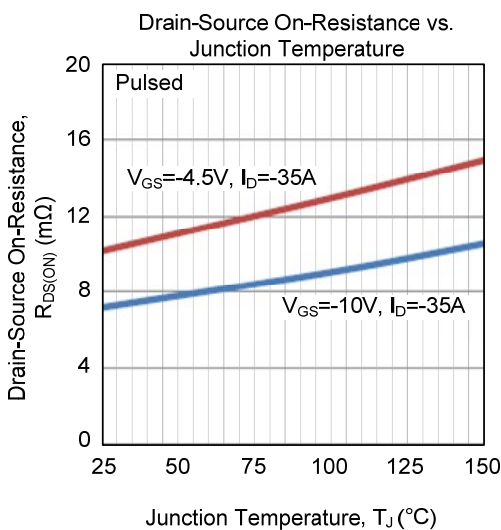
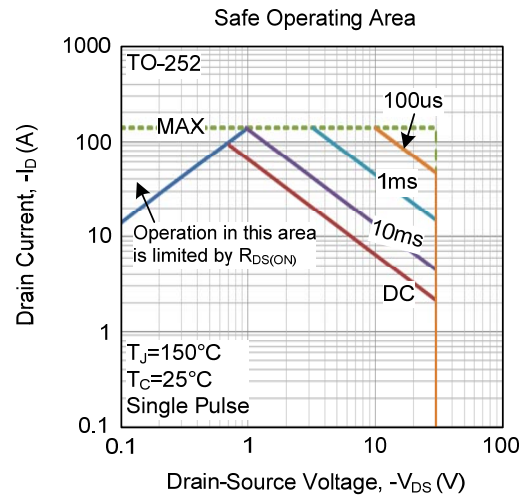
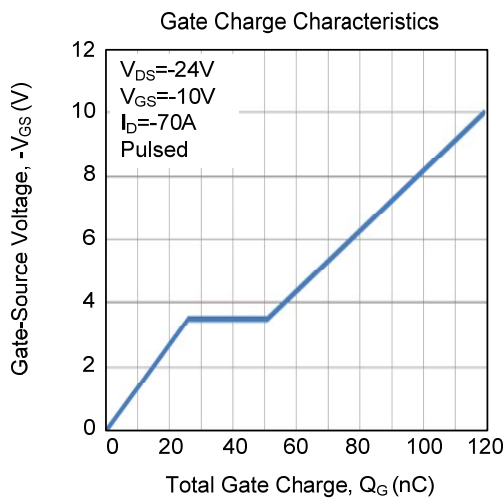
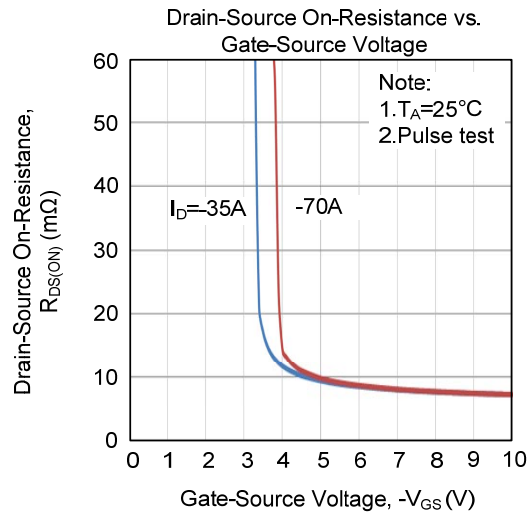
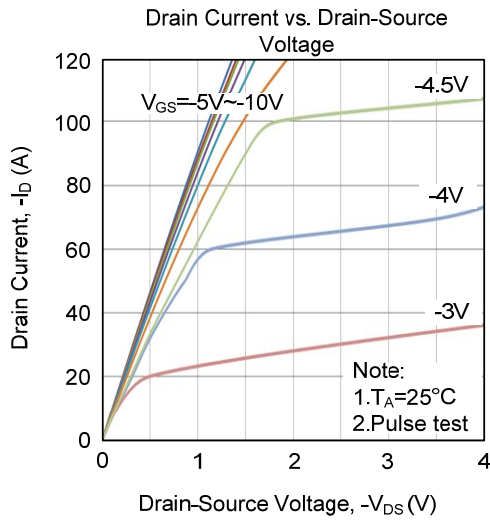


**Unclamped Inductive Switching Test Circuit**

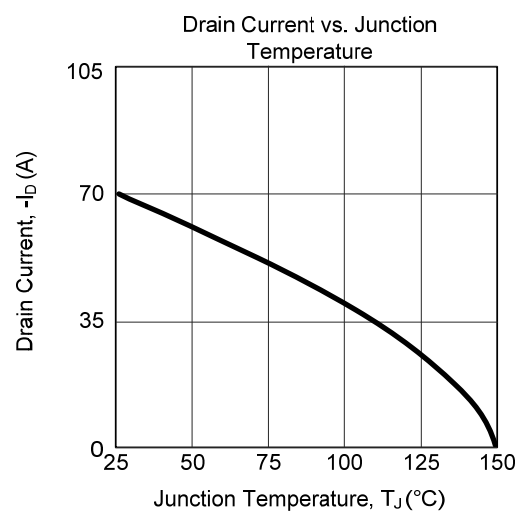
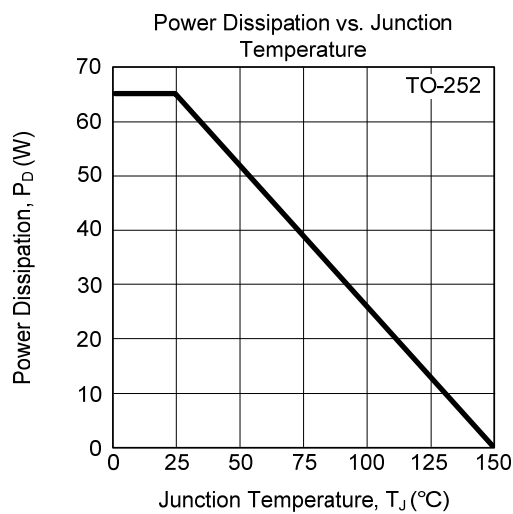
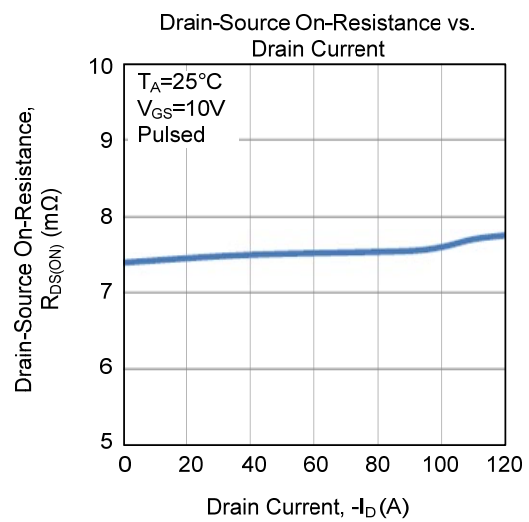
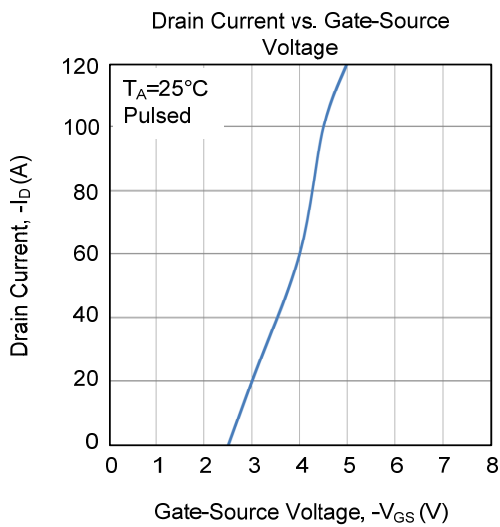
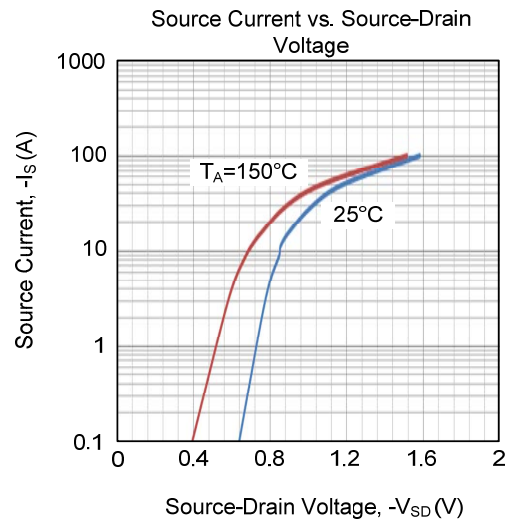
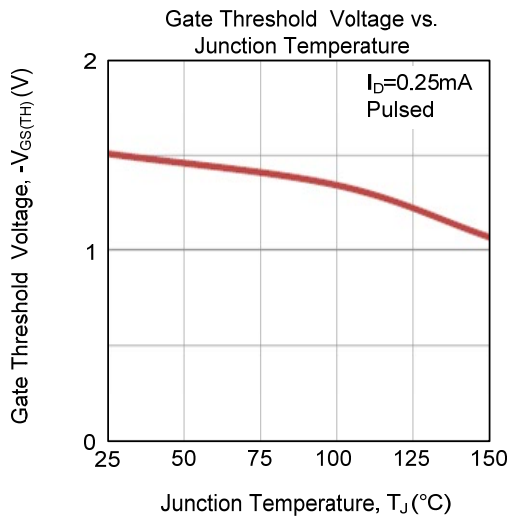


**Unclamped Inductive Switching Waveforms**

## TYPICAL CHARACTERISTICS

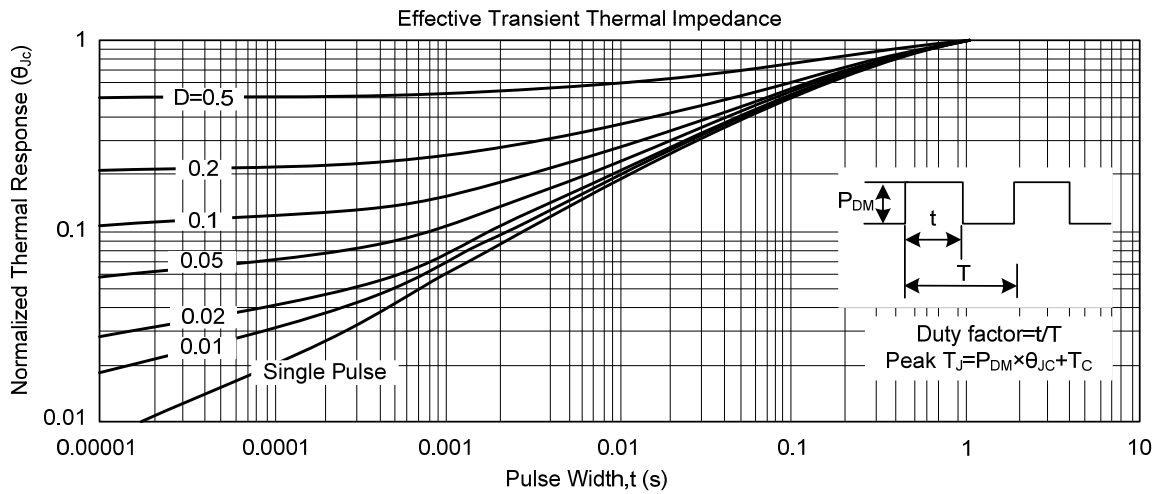


## ■ TYPICAL CHARACTERISTICS (Cont.)





■ TYPICAL CHARACTERISTICS (Cont.)



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