



UT70P03

Power MOSFET

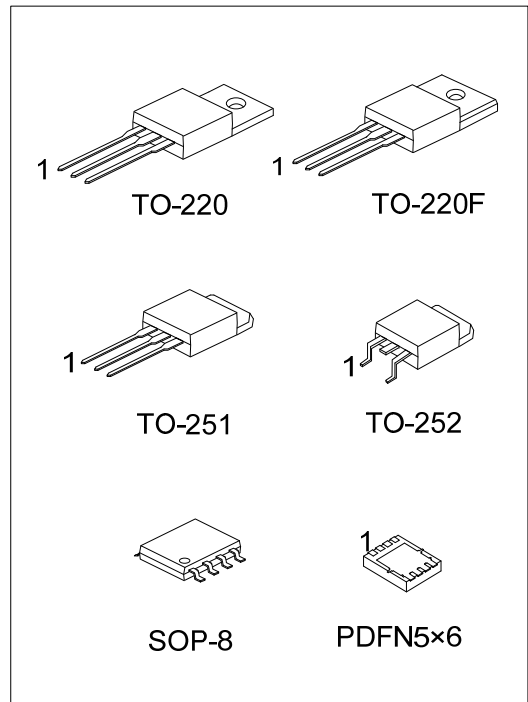
-70A, -30V P-CHANNEL POWER MOSFET

DESCRIPTION

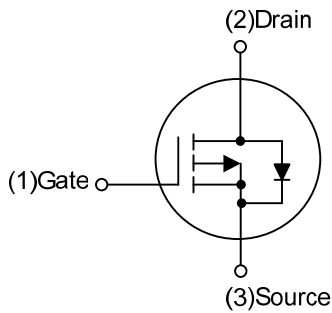
The **UT70P03** uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

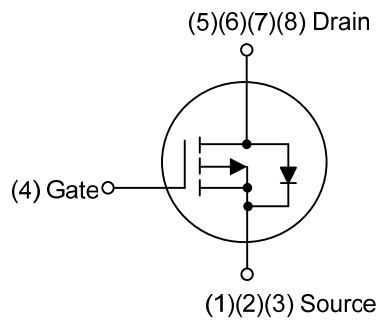
- * $R_{DS(ON)} \leq 7.0 \text{ m}\Omega$ @ $V_{GS}=-10\text{V}$, $I_D=-35\text{A}$
- * $R_{DS(ON)} \leq 11 \text{ m}\Omega$ @ $V_{GS}=-4.5\text{V}$, $I_D=-35\text{A}$
- * Low Capacitance
- * Low Gate Charge
- * Fast Switching Capability
- * Avalanche Energy Specified



SYMBOL



TO-220/TO-220F
TO-251/TO-252



SOP-8/PDFN5x6

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-S08-R	UT70P03G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UT70P03L-P5060-R	UT70P03G-P5060-R	PDFN5×6	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) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TM3: TO-251 TN3: TO-252, 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-220F TO-251 / TO-252	<p>UTC UT70P03 □□□□ □□□□</p> <p>L: Lead Free G: Halogen Free Date Code Lot Code</p>
SOP-8	<p>UTC UT70P03 □□□□ □□□□ L</p> <p>Date Code L: Lead Free G: Halogen Free Lot Code</p>
PDFN5×6	<p>UTC UT 70P03 □□□□ □□□□</p> <p>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}	± 20	V
Continuous Drain Current ($T_C=25^{\circ}\text{C}$)	TO-220/TO-220F TO-251/TO-252	I_D	-70	A
	SOP-8/PDFN5x6		-50	A
Pulsed Drain Current(Note 2)	TO-220/TO-220F TO-251/TO-252	I_{DM}	-140	A
	SOP-8/PDFN5x6		-100	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	211	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	0.6	V/ns
Power Dissipation ($T_C=25^{\circ}\text{C}$)	TO-220	P_D	90	W
	TO-220F		32	W
	TO-251/TO-252		45	W
	SOP-8		3	W
	PDFN5x6		42	W
Junction Temperature		T_J	+175	$^{\circ}\text{C}$
Strong 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. $L = 0.1\text{mH}$, $I_{AS} = -65\text{A}$, $V_{DD} = -20\text{V}$, $R_G = 25\Omega$, 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	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-252		110	
	SOP-8		90 (Note)	
	PDFN5x6		65 (Note)	
Junction to Case	TO-220	θ_{JC}	1.38	$^{\circ}\text{C}/\text{W}$
	TO-220F		3.9	
	TO-251/TO-252		2.77 (Note)	
	SOP-8		41.6 (Note)	
	PDFN5x6		2.97 (Note)	

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

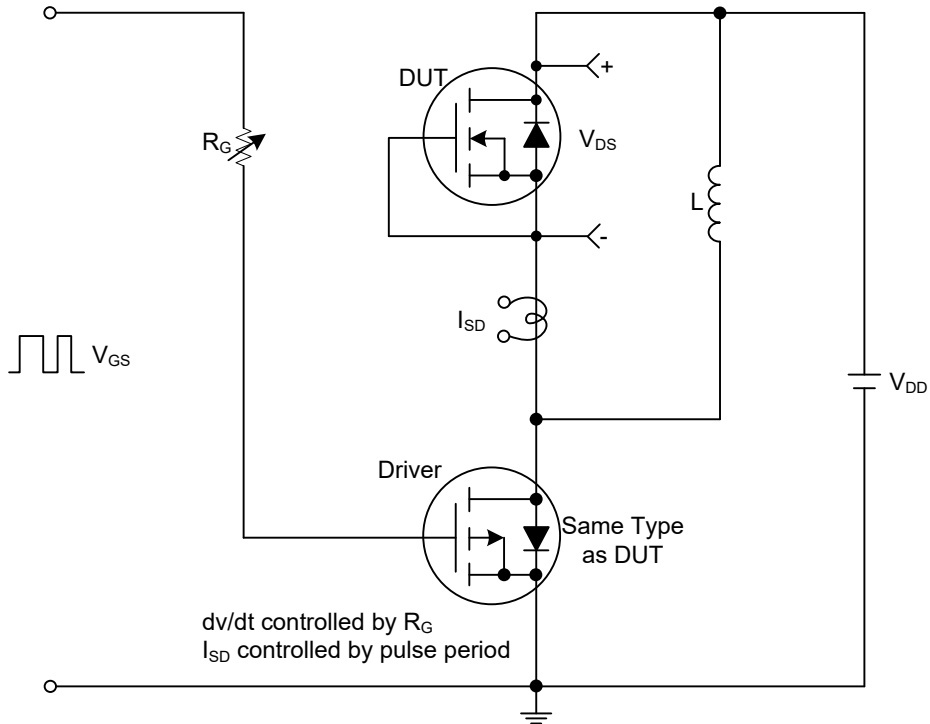
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-30			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V			-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = ±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0		-3.0	V
Static Drain-Source On-Resistance (Note 2)	R _{DS(ON)}	V _{GS} =-10V, I _D =-35A			7.0	mΩ
		V _{GS} =-4.5V, I _D =-35A			11	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1.0MHz		5000		pF
Output Capacitance	C _{OSS}			800		pF
Reverse Transfer Capacitance	C _{RSS}			680		pF
SWITCHING PARAMETERS						
Total Gate Charge(Note 2)	Q _G	V _{DS} =-24V, V _{GS} =-10V, I _D =-70A (Note 1, 2)		100		nC
Gate Source Charge	Q _{GS}			13		nC
Gate Drain ("Miller") Charge	Q _{GD}			28		nC
Turn-ON Delay Time(Note 2)	t _{D(ON)}	V _{DS} =-15V, V _{GS} =-10V, I _D =-70A, R _G =3.3Ω (Note 1, 2)		16		ns
Turn-ON Rise Time	t _R			20		ns
Turn-OFF Delay Time	t _{D(OFF)}			96		ns
Turn-OFF Fall-Time	t _F			65		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
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 A/μs		160		ns
Reverse Recovery Charge	Q _{rr}			460		nC

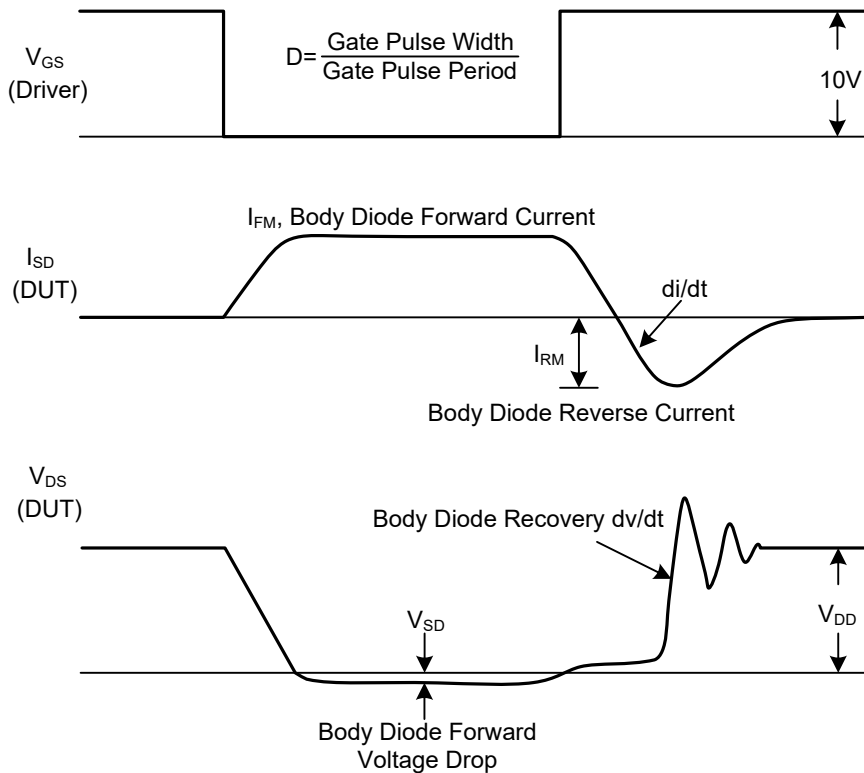
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



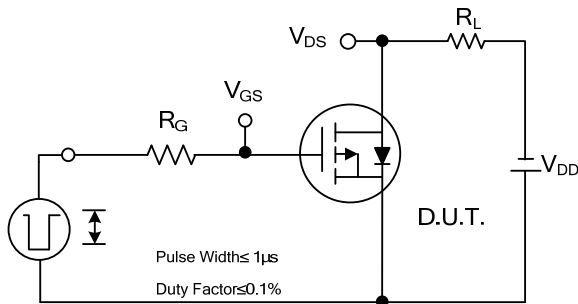
Peak Diode Recovery dv/dt Test Circuit



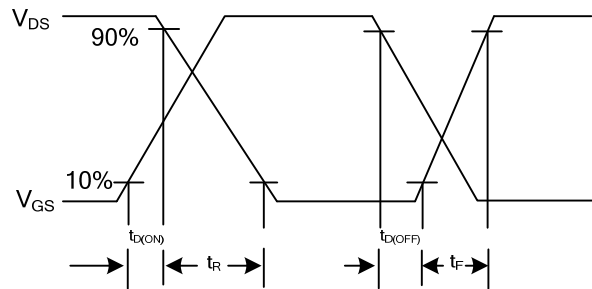
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

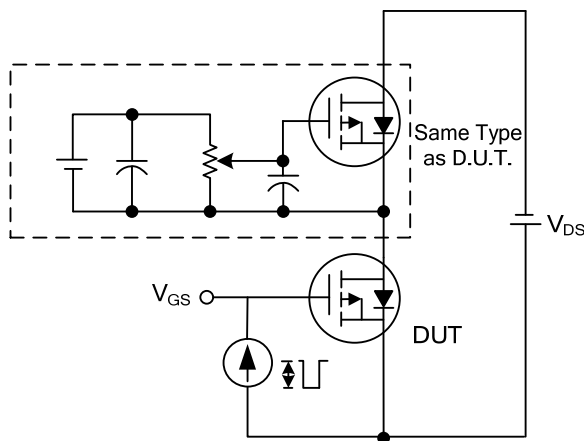
TEST CIRCUITS AND WAVEFORMS



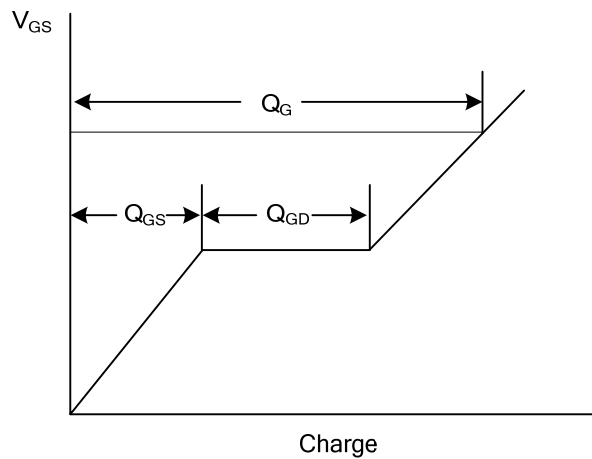
Switching Test Circuit



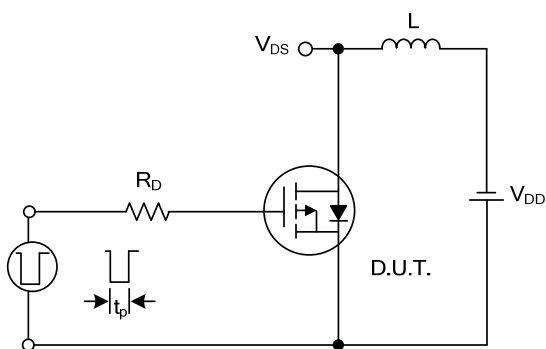
Switching Waveforms



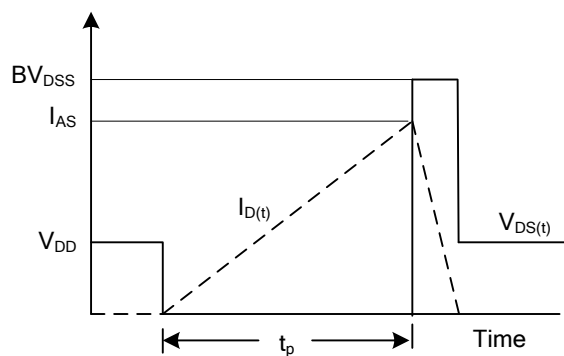
Gate Charge Test Circuit



Gate Charge Waveform

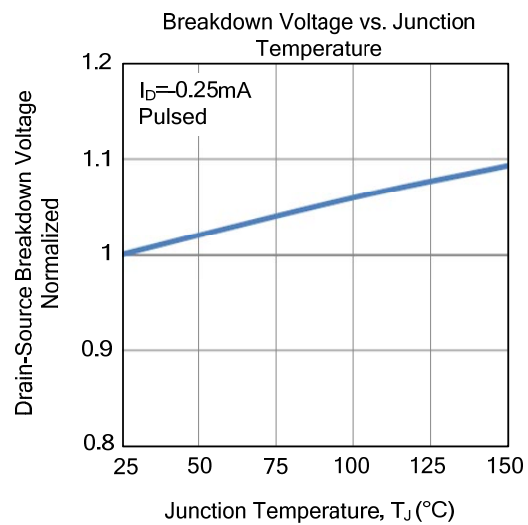
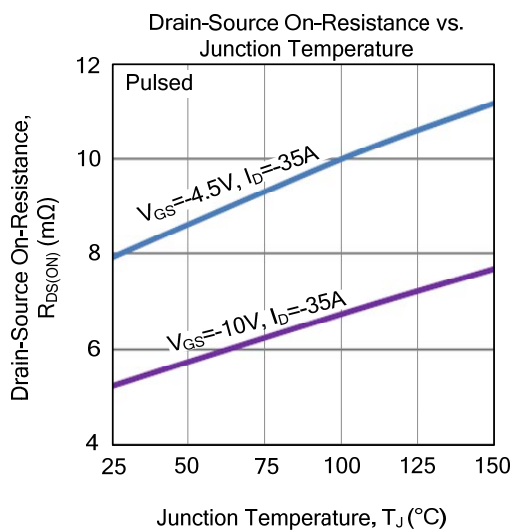
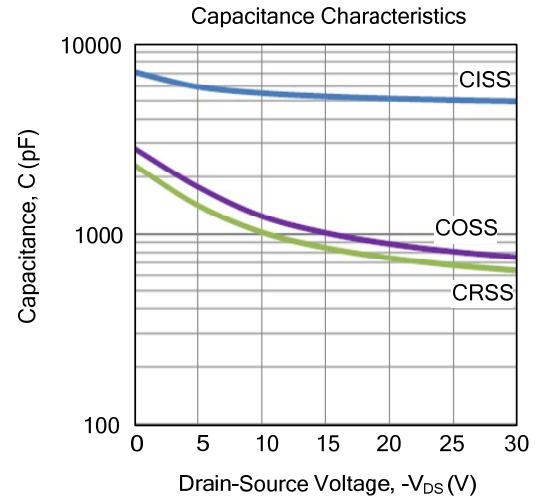
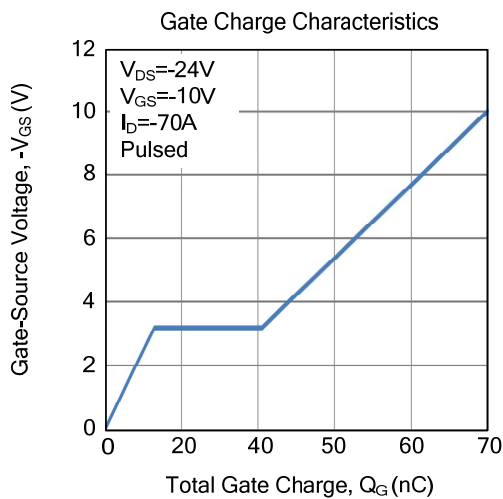
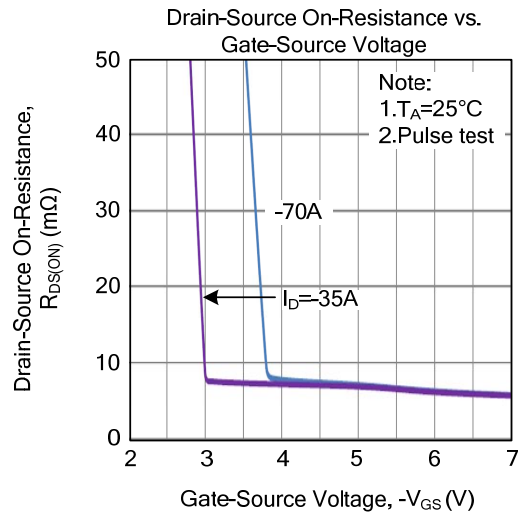
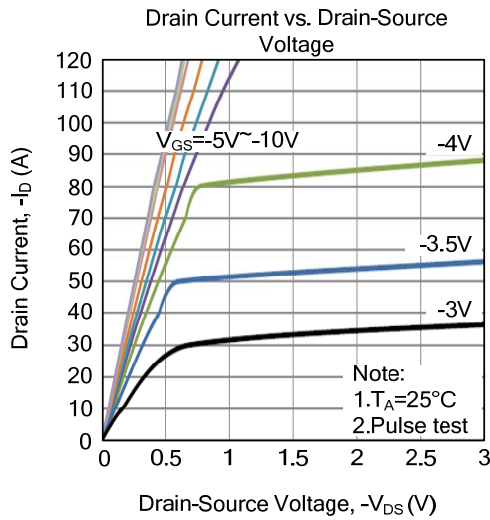


Unclamped Inductive Switching Test Circuit

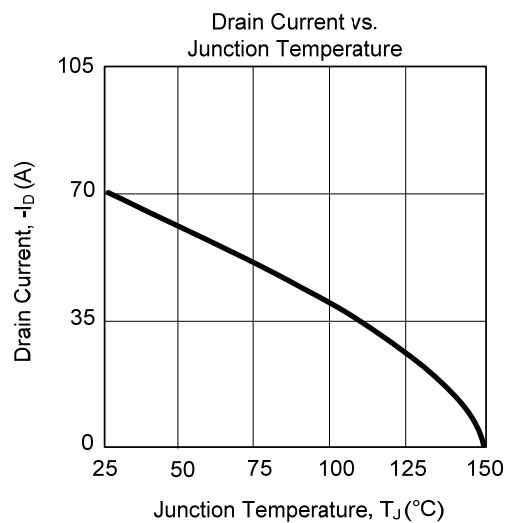
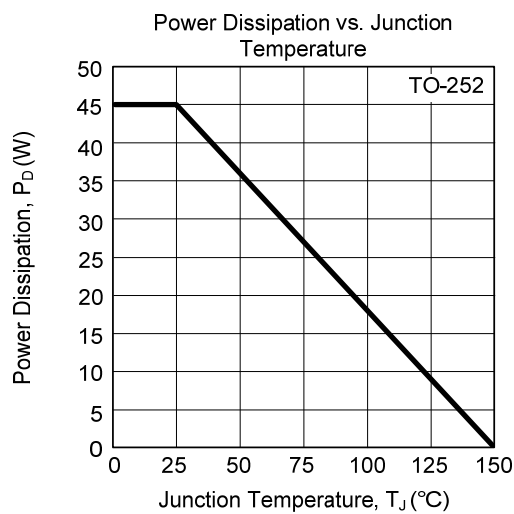
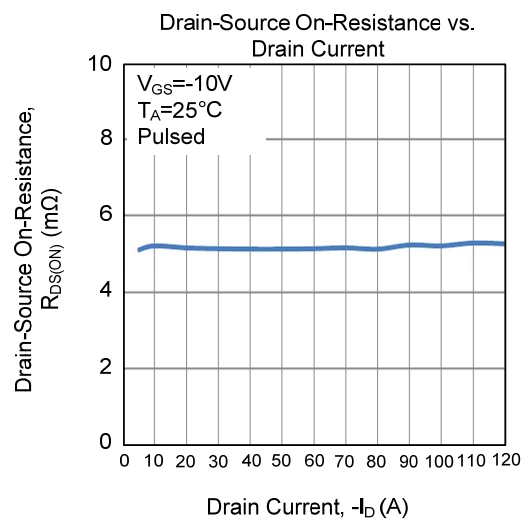
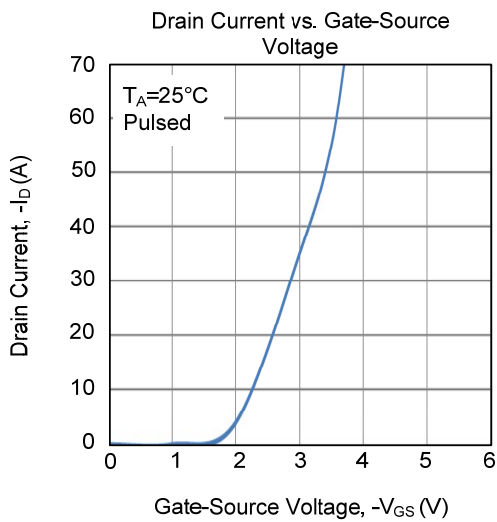
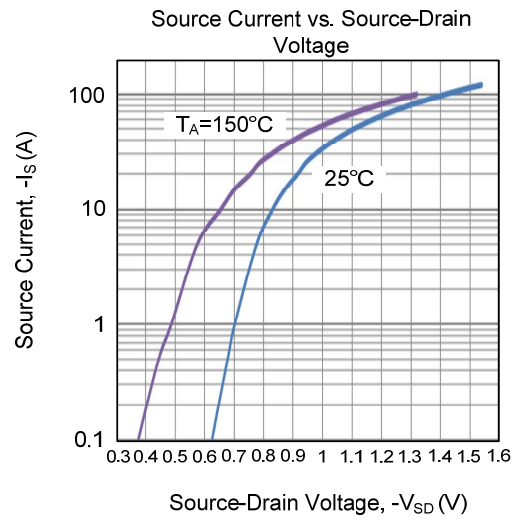
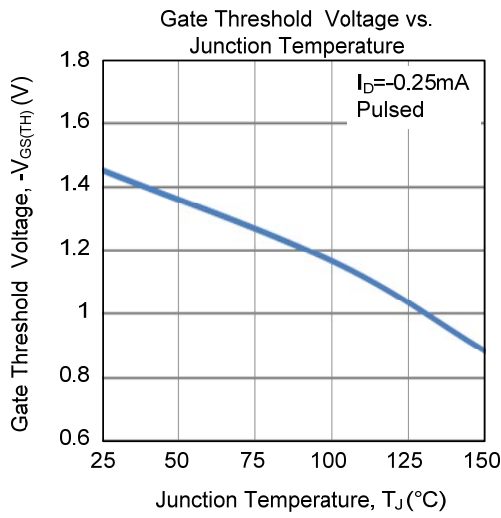


Unclamped Inductive Switching Waveforms

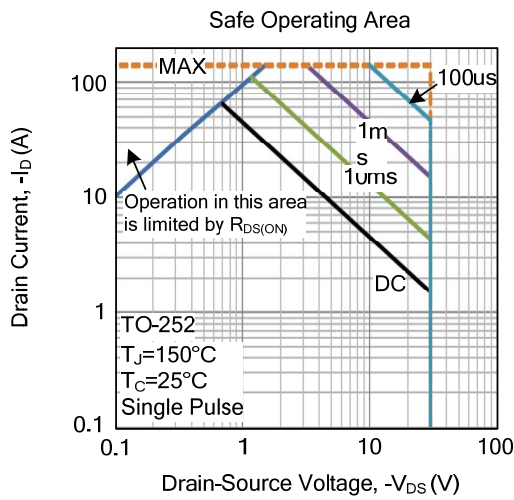
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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