

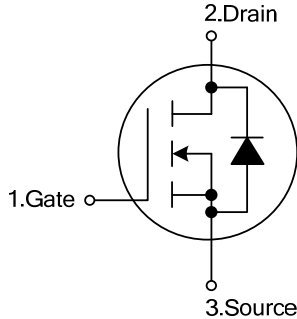
**7N10****Power MOSFET****7.0A, 100V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **7N10** is an N-Channel enhancement mode power MOSFET, providing customers with excellent switching performance and minimum on-state resistance. The UTC **7N10** uses planar stripe and DMOS technology to provide perfect quality. This device can also withstand high energy pulse in the avalanche and the commutation mode.

The UTC **7N10** is generally applied in low voltage applications, such as DC motor controls, audio amplifiers and high efficiency switching DC/DC converters.

FEATURES

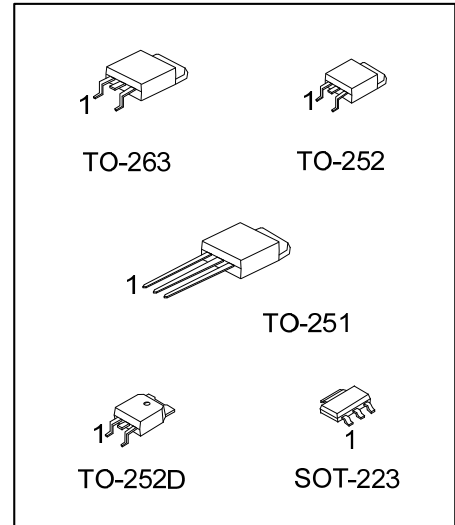
- * $R_{DS(ON)} \leq 0.35 \Omega$ @ $V_{GS}=10V$, $I_D=3.5A$
- * Fast Switching
- * Improved dv/dt Capability

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N10L-AA3-R	7N10G-AA3-R	SOT-223	G	D	S	Tape Reel
7N10L-TM3-T	7N10G-TM3-T	TO-251	G	D	S	Tube
7N10L-TN3-R	7N10G-TN3-R	TO-252	G	D	S	Tape Reel
7N10L-TND-R	7N10G-TND-R	TO-252D	G	D	S	Tape Reel
7N10L-TQ2-T	7N10G-TQ2-T	TO-263	G	D	S	Tube
7N10L-TQ2-R	7N10G-TQ2-R	TO-263	G	D	S	Tape Reel

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

7N10G-AA3-R (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) AA3: SOT-223, TM3: TO-251, TN3: TO-252, TND: TO-252D, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING

SOT-223	TO-251 / TO-252 / TO-252D
7N10 1 L: Lead Free G: Halogen Free Date Code	UTC 7N10 1 Lot Code L: Lead Free G: Halogen Free Date Code

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain -Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 25	V
Continuous Drain Current		I_D	7	A
Pulsed Drain Current (Note 2)		I_{DM}	14	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	117	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	6.0	V/ns
Power Dissipation	SOT-223	P_D	2.5	W
	TO-251/TO-252		32	W
	TO-252D			
	TO-263		55	W
Operating Junction Temperature		T_J	$-55 \sim +150$	$^\circ\text{C}$
Storage Temperature		T_{STG}	$-55 \sim +150$	$^\circ\text{C}$

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. $L = 30\text{mH}$, $I_{AS} = 2.8\text{A}$, $V_{DD} = 25\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 7.0\text{A}$, $di/dt \leq 300\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	140	$^\circ\text{C/W}$
	TO-251/TO-252		110	$^\circ\text{C/W}$
	TO-252D			
	TO-263		62.5	$^\circ\text{C/W}$
Junction to Case	SOT-223	θ_{JC}	50	$^\circ\text{C/W}$
	TO-251/TO-252		3.9	$^\circ\text{C/W}$
	TO-252D			
	TO-263		2.27	$^\circ\text{C/W}$

Note: When mounted on the minimum pad size recommended (PCB Mount).

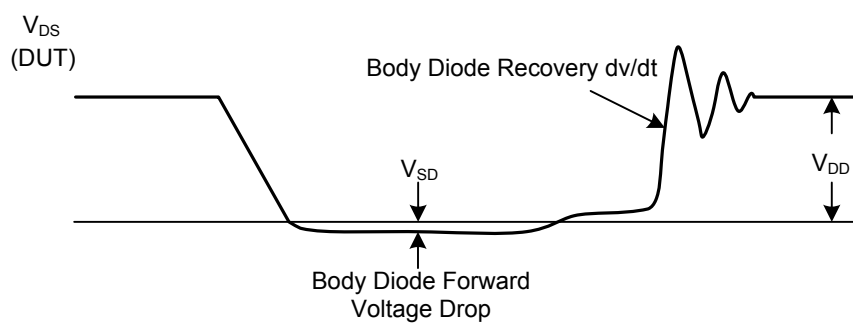
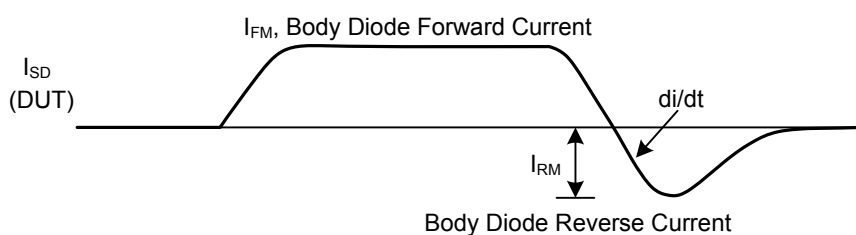
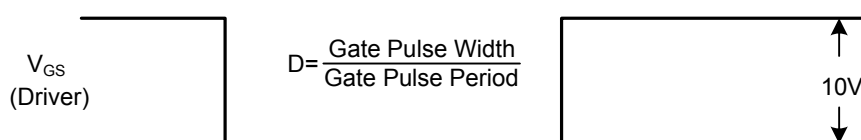
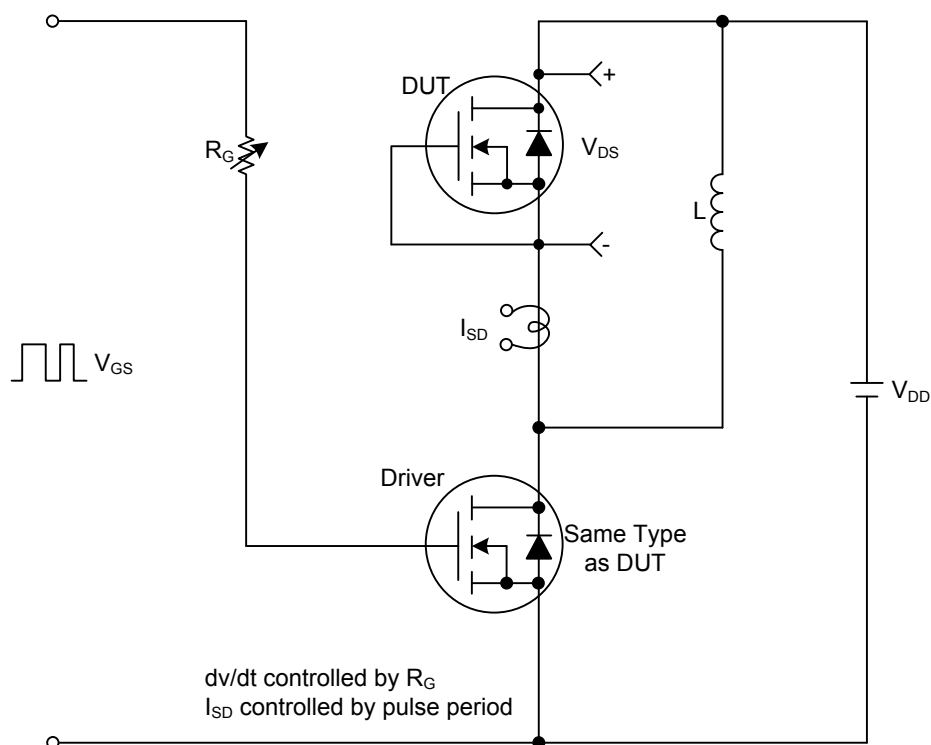
■ **ELECTRICAL CHARACTERISTICS** ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	100			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V			1	μA
		V _{DS} =80V, T _C =125°C			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±25V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =3.5A		0.144	0.35	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		370		pF
Output Capacitance	C _{OSS}			70		pF
Reverse Transfer Capacitance	C _{RSS}			9		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =80V, V _{GS} =10V, I _D =7.0A, I _G =1mA (Note 1, 2)		13.5		nC
Gate Source Charge	Q _{GS}			5		nC
Gate Drain Charge	Q _{GD}			2.3		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =7.0A, R _G =25Ω (Note 1, 2)		5		ns
Turn-ON Rise Time	t _R			16		ns
Turn-OFF Delay Time	t _{D(OFF)}			20		ns
Turn-OFF Fall-Time	t _F			18		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				14	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =7A, V _{GS} =0V			1.5	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =7.3A,		71		ns
Reverse Recovery Charge	Q _{rr}	di _F /dt=100A/μs		304		nC

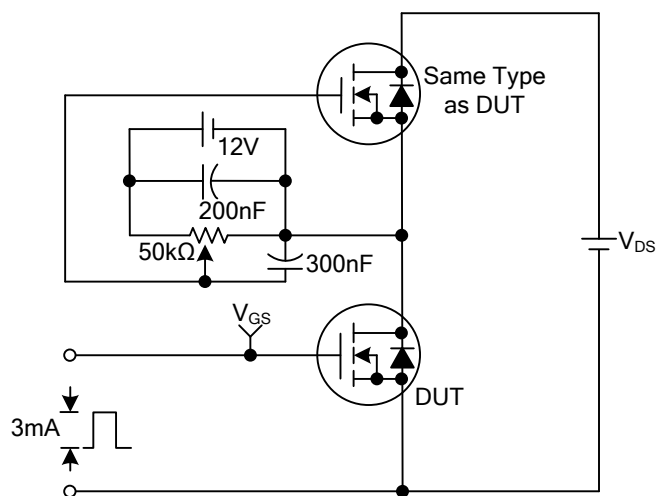
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

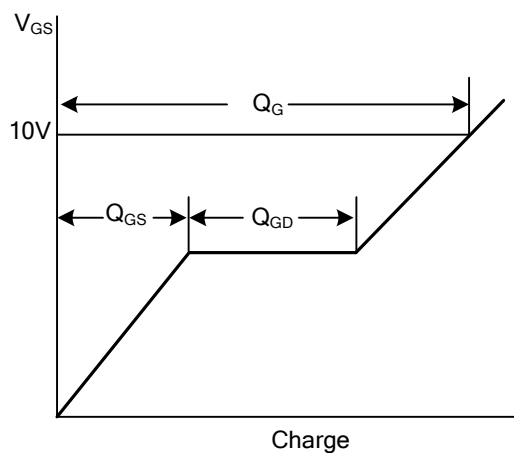
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

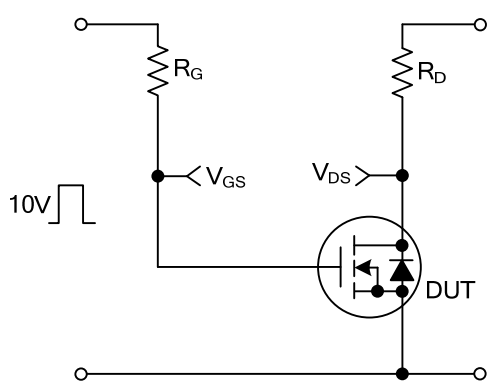
■ TEST CIRCUITS AND WAVEFORMS



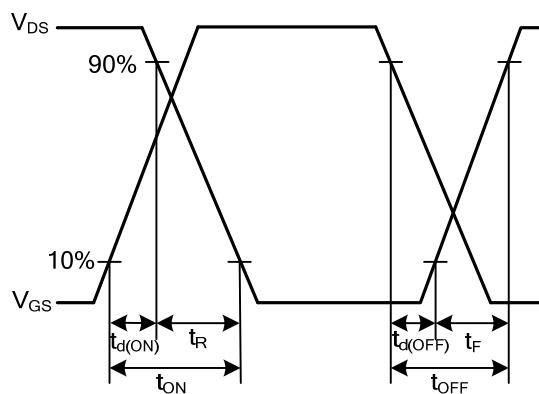
Gate Charge Test Circuit



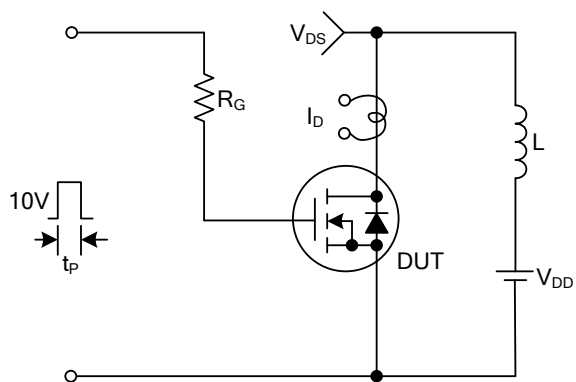
Gate Charge Waveforms



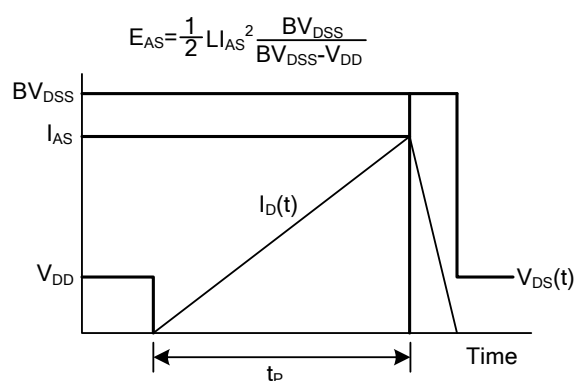
Resistive Switching Test Circuit



Resistive Switching Waveforms

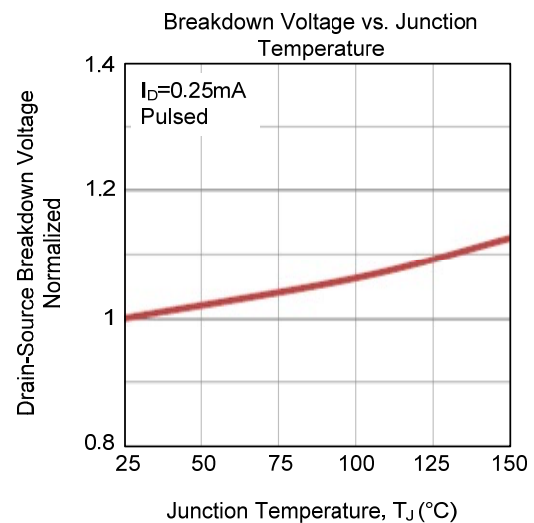
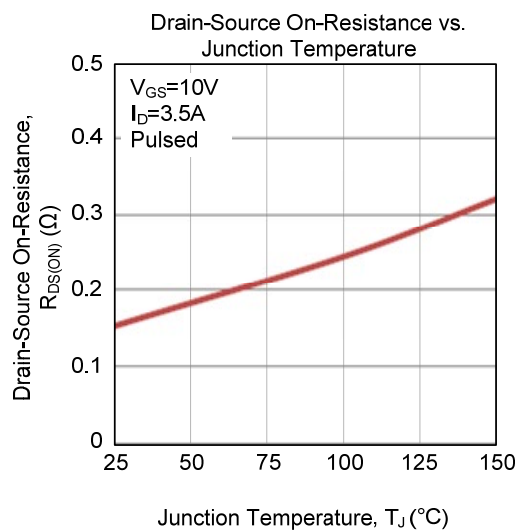
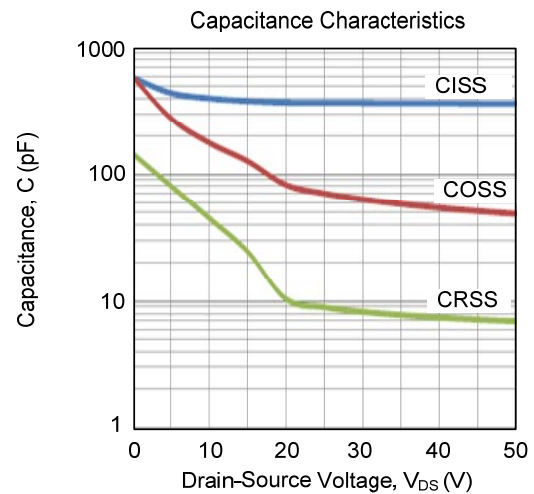
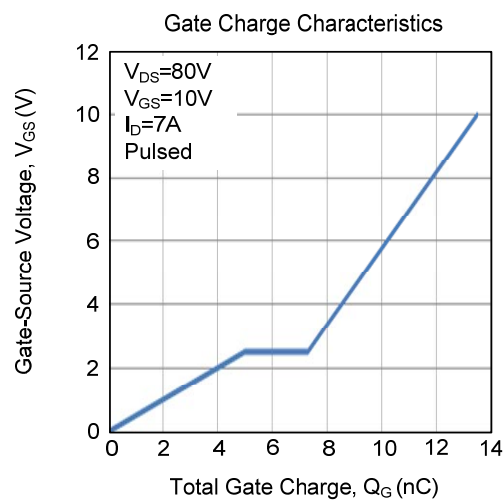
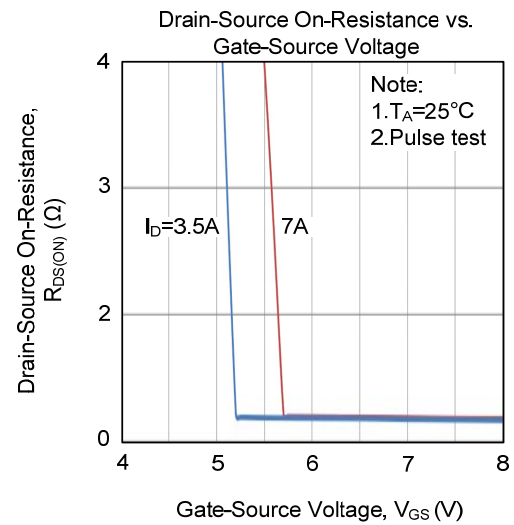
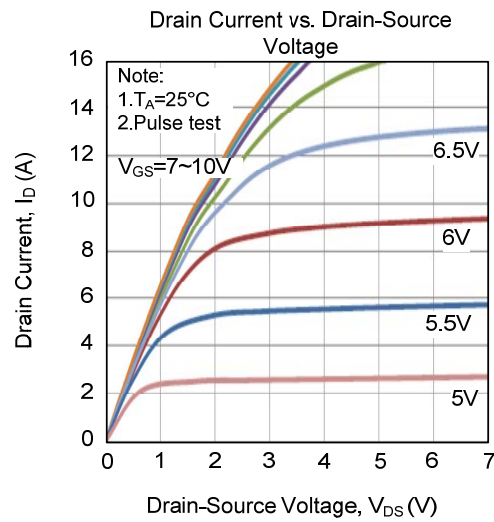


Unclamped Inductive Switching Test Circuit

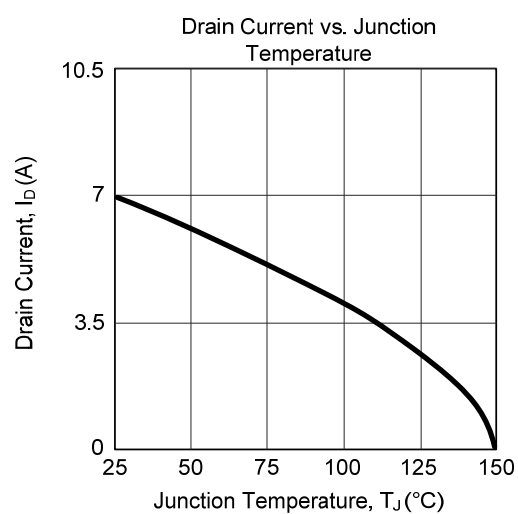
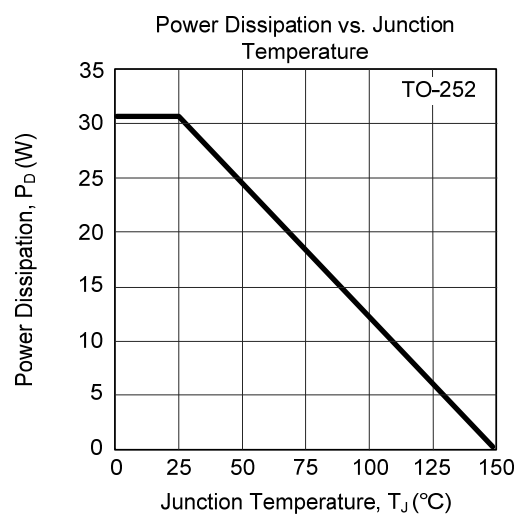
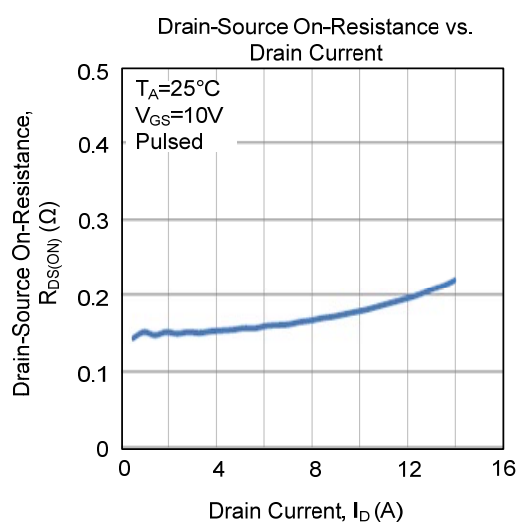
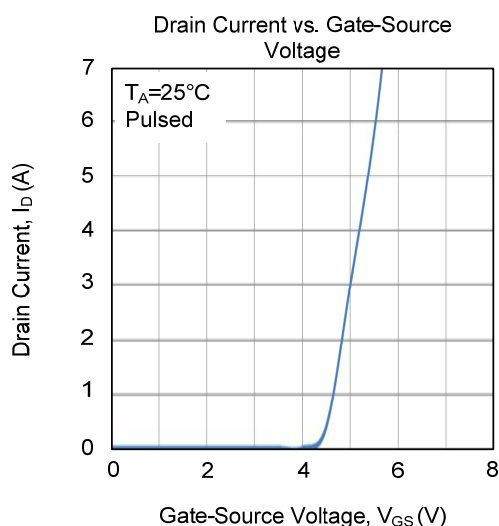
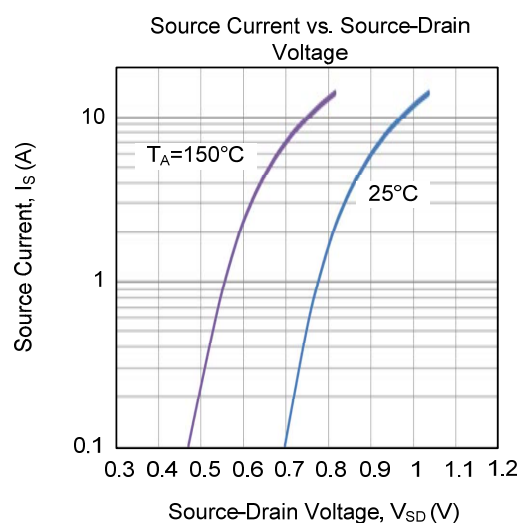
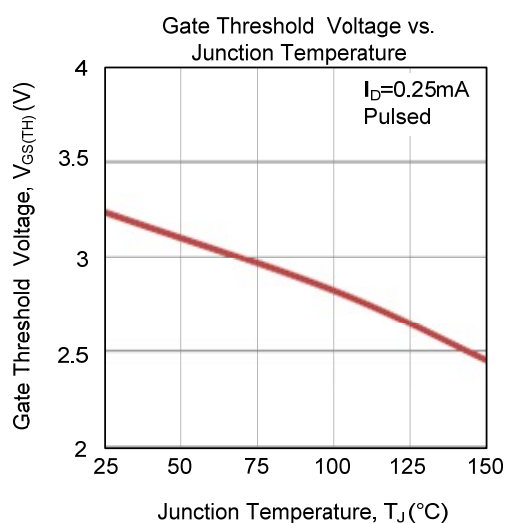


Unclamped Inductive Switching Waveforms

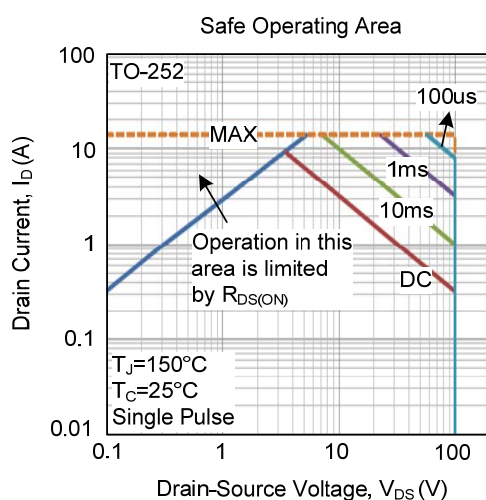
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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