



20N70-HCQ

Power MOSFET

20A, 700V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **20N70-HCQ** is a N-channel enhancement MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$, high switching speed, high current capacity and low gate charge.

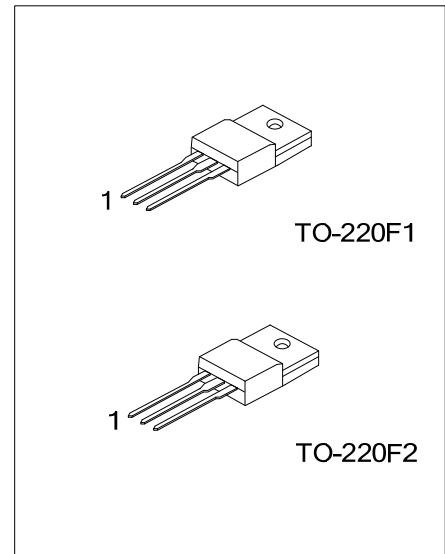
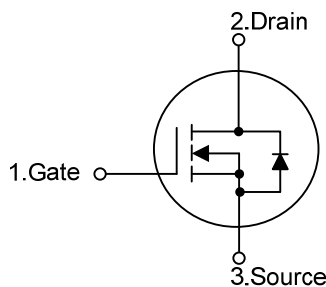
The UTC **20N70-HCQ** is universally applied in low voltage such as automotive, high efficiency switching for AC/DC converters and DC motor control, etc.

FEATURES

* $R_{DS(ON)} \leq 0.6 \Omega @ V_{GS}=10V, I_D=10A$

* High Switching Speed

SYMBOL



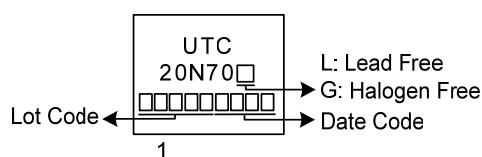
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
20N70L-TF1-T	20N70G-TF1-T	TO-220F1	G	D	S	Tube
20N70L-TF2-T	20N70G-TF2-T	TO-220F2	G	D	S	Tube

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

<p>20N70G-TF1-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube</p> <p>(2) TF1: TO-220F1, TF2: TO-220F2</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	V_{DSS}	700	V
Gate-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current	Continuous	I_D	20
	Pulsed	I_{DM}	40
Single Pulsed Avalanche Energy	E_{AS}	590	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	2.2	V/ns
Power Dissipation	P_D	45	W
Junction Temperature	T_J	+150	$^{\circ}C$
Storage Temperature	T_{STG}	-55 ~ +150	$^{\circ}C$

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. $L=30mH$, $I_{AS}=6.2A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J = 25^{\circ}C$

4. $I_{SD} \leq 20A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}C$

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	$^{\circ}C/W$
Junction to Case	θ_{JC}	2.77	$^{\circ}C/W$

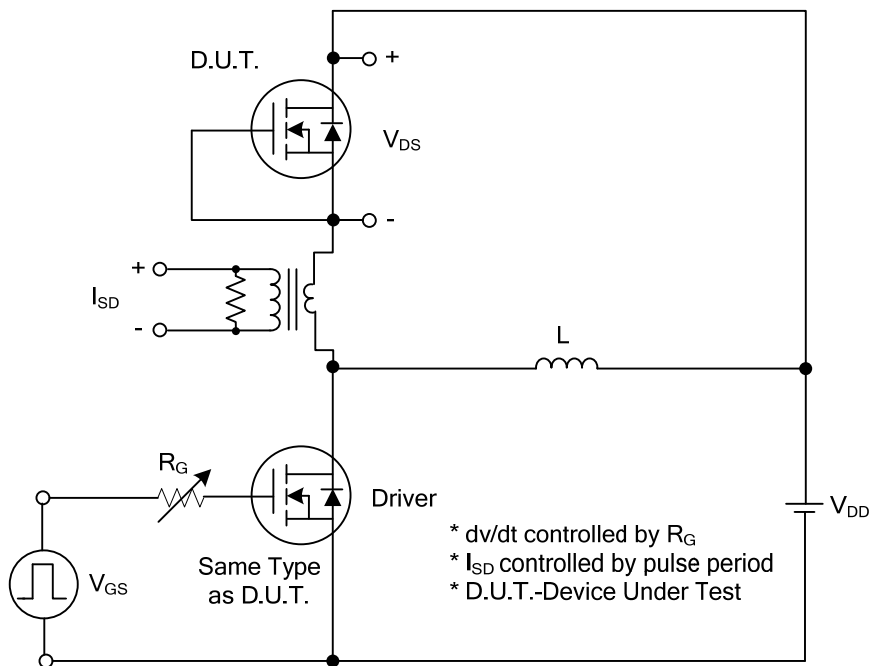
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu A$, $V_{GS}=0V$	700			V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=700V$, $V_{GS}=0V$			10	μA	
Gate-Source Leakage Current	I_{GSS}	Forward			+100	nA	
		Reverse			-100	nA	
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu A$	2.0		4.0	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V$, $I_D=10A$		0.5	0.6	Ω	
DYNAMIC PARAMETERS							
Input Capacitance	C_{ISS}	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0MHz$		2800		pF	
Output Capacitance	C_{OSS}				240		pF
Reverse Transfer Capacitance	C_{RSS}				23		pF
SWITCHING PARAMETERS							
Total Gate Charge	Q_G	$V_{DS}=560V$, $V_{GS}=10V$, $I_D=20A$ $I_G=1mA$ (Note 1, 2)		70		nC	
Gate to Source Charge	Q_{GS}			18		nC	
Gate to Drain Charge	Q_{GD}			23		nC	
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100V$, $V_{GS}=10V$, $I_D=20A$, $R_G=25\Omega$ (Note 1, 2)		40		ns	
Rise Time	t_R			30		ns	
Turn-OFF Delay Time	$t_{D(OFF)}$			210		ns	
Fall-Time	t_F			56		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current	I_S				20	A	
Maximum Body-Diode Pulsed Current	I_{SM}				40	A	
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=20A$, $V_{GS}=0V$			1.4	V	
Body Diode Reverse Recovery Time	t_{rr}	$I_S=20A$, $V_{GS}=0V$, $dI_F/dt=100A/\mu s$ (Note 1)		508		ns	
Reverse Recovery Charge	Q_{rr}				9.6		μC

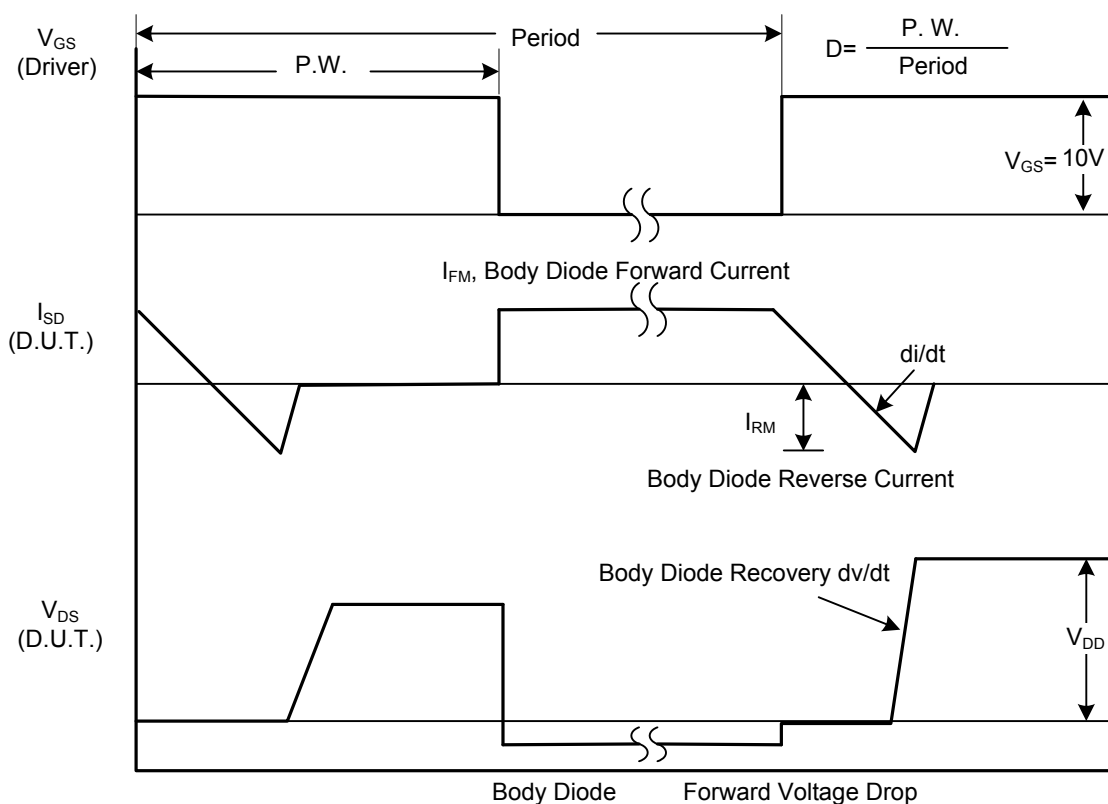
Notes: 1. Pulse Test: Pulse width $\leq 700\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

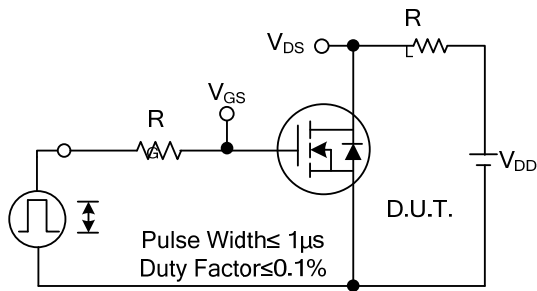


Peak Diode Recovery dv/dt Test Circuit

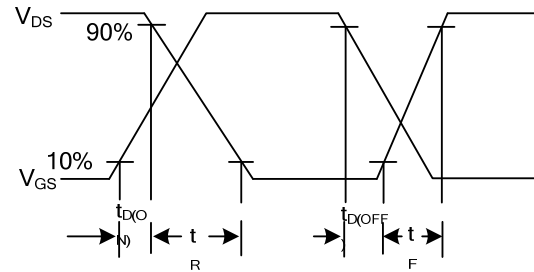


Peak Diode Recovery dv/dt Waveforms

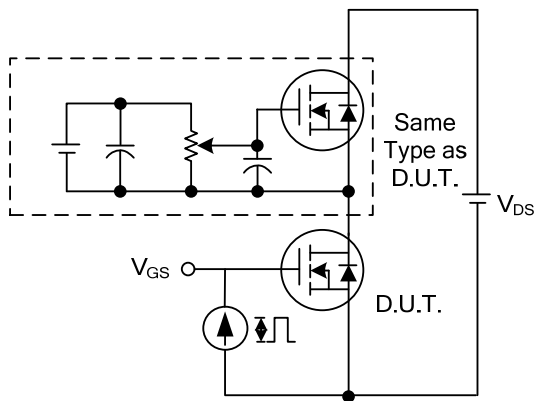
TEST CIRCUITS AND WAVEFORMS



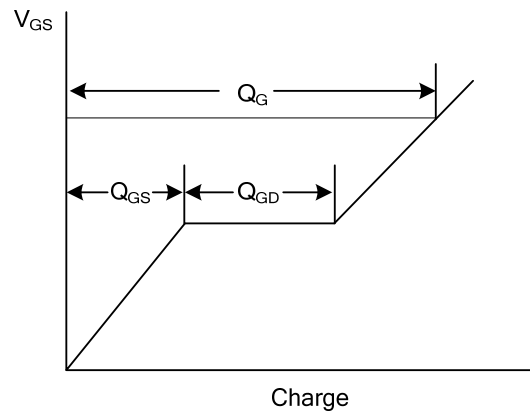
Switching Test Circuit



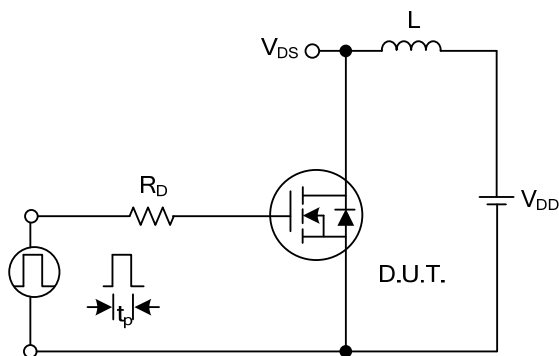
Switching Waveforms



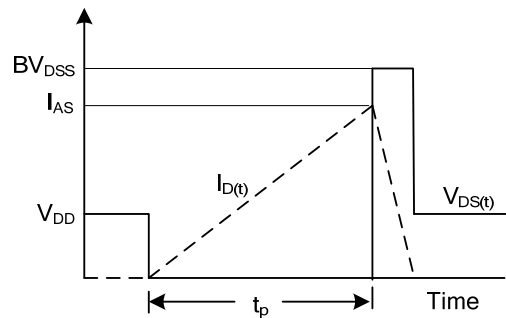
Gate Charge Test Circuit



Gate Charge Waveform

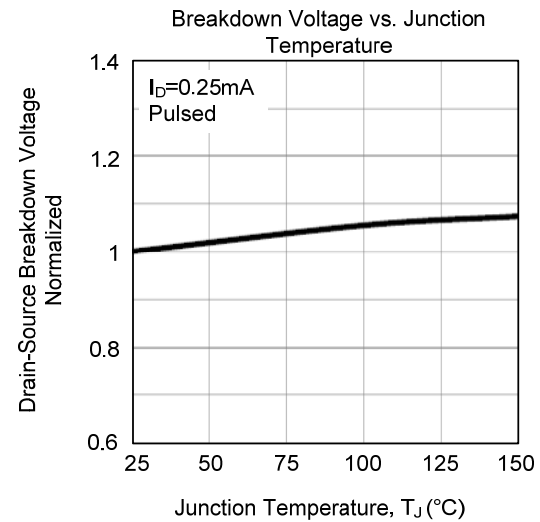
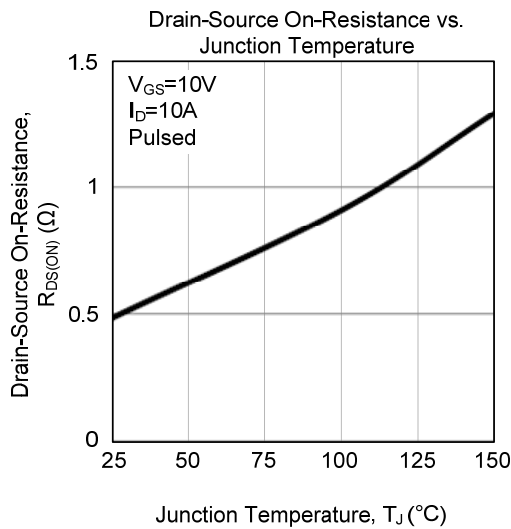
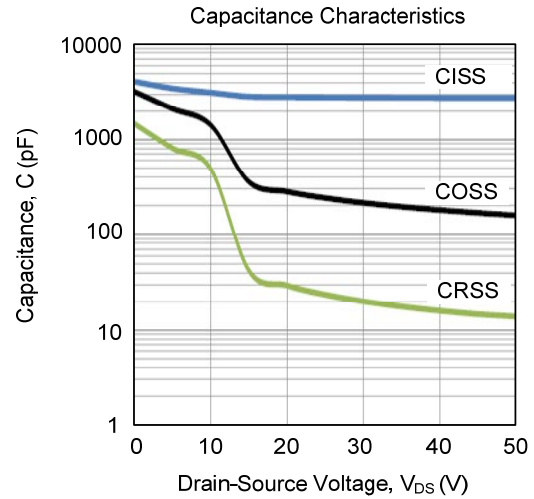
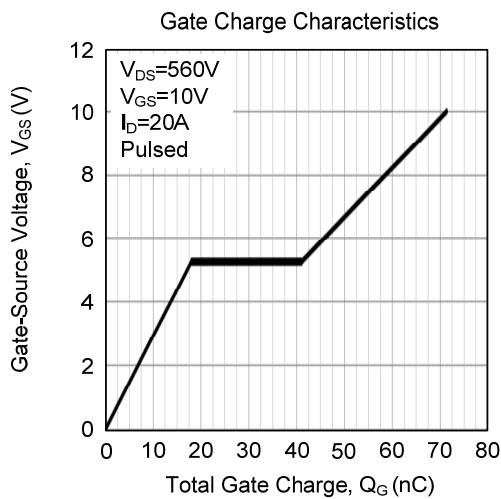
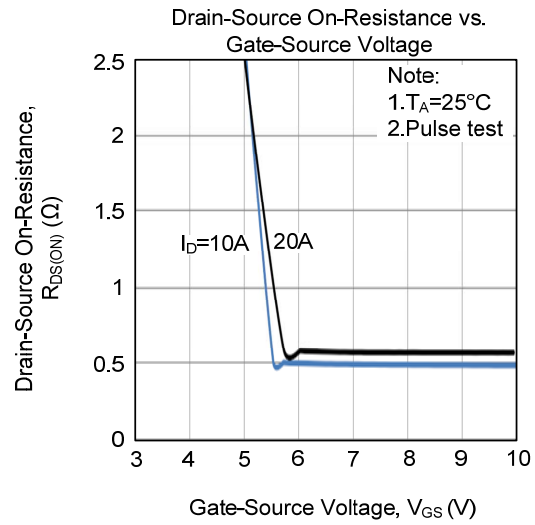
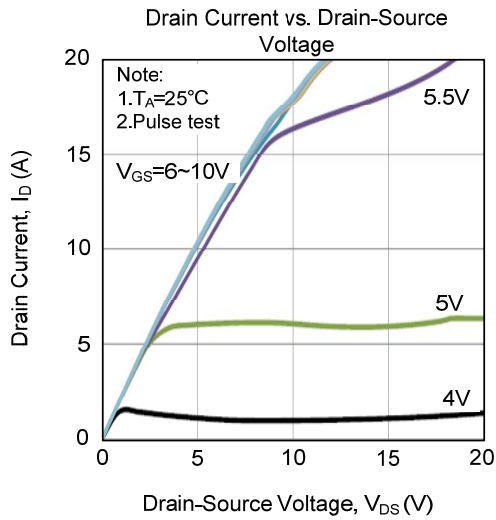


Unclamped Inductive Switching Test Circuit

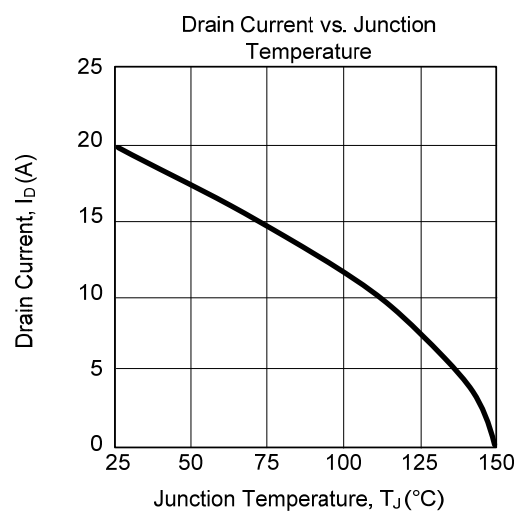
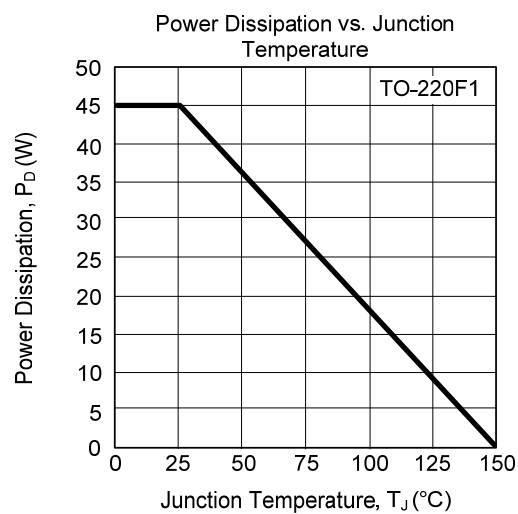
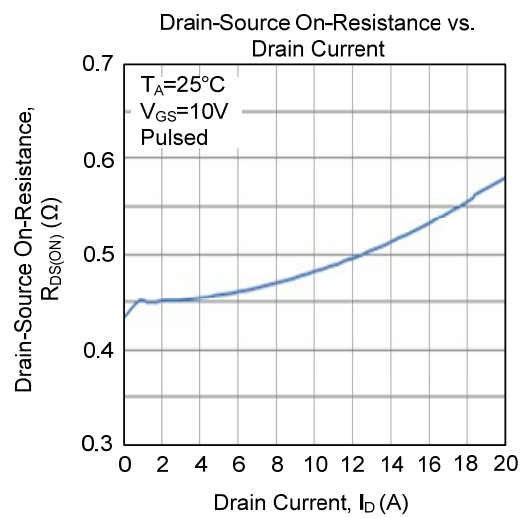
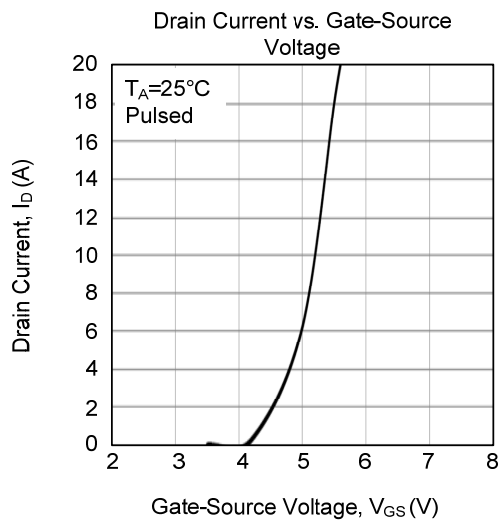
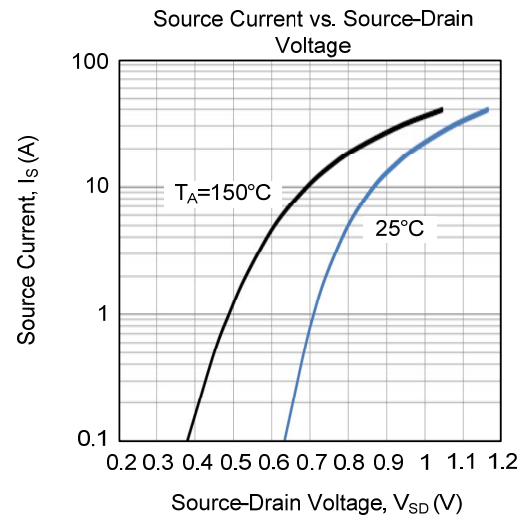
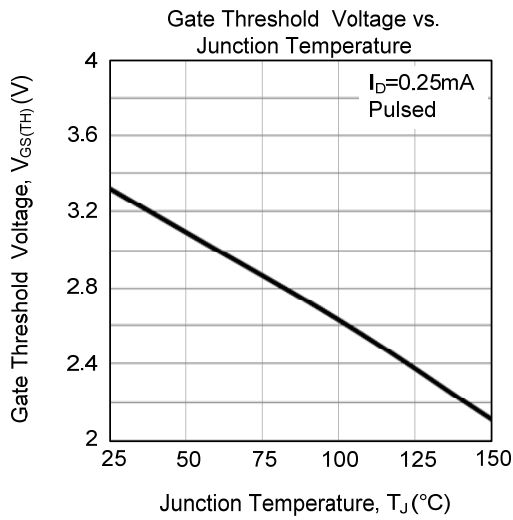


Unclamped Inductive Switching Waveforms

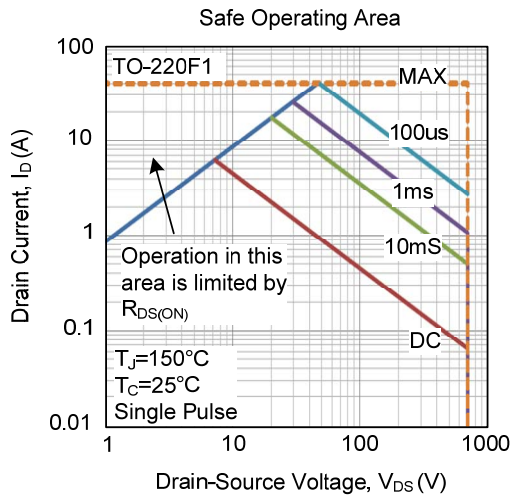
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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