



F20NM50

POWER MOSFET

20A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

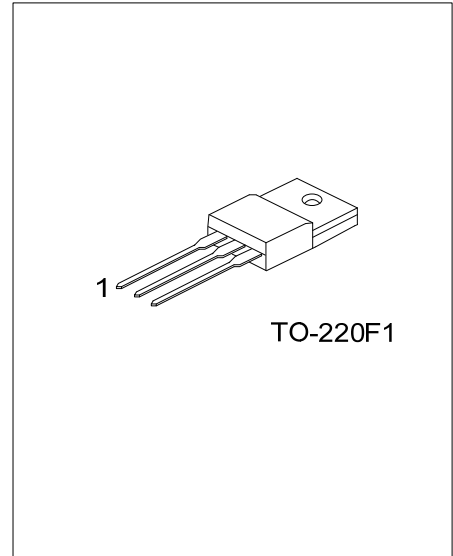
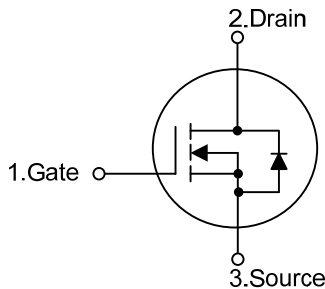
DESCRIPTION

The **UTC F20NM50** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

FEATURES

- * $R_{DS(on)} \leq 0.22 \Omega @ V_{GS} = 10V, I_D = 10A$
- * Improved dv/dt capability
- * Fast switching
- * 100% avalanche tested

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
F20NM50L-TF1-T	F20NM50G-TF1-T	TO-220F1	G	D	S	Tube

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

<p>F20NM50G-TF1-T</p>	<p>(1) Packing Type (1) T: Tube (2) TF1: TO-220F1 (3) G: Halogen Free and Lead Free, L: Lead Free</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}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current ($T_c=25^\circ\text{C}$)	Continuous	I_D	20	A
	Pulsed (Note 2)	I_{DM}	60	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	325	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.7	V/ns
Power Dissipation		P_D	33	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +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. $L = 100\text{mH}$, $I_{AS} = 2.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.
 4. $I_{SD} \leq 20\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$.

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	3.78	$^\circ\text{C}/\text{W}$

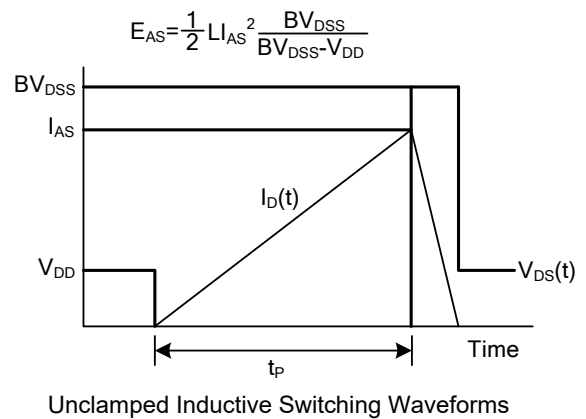
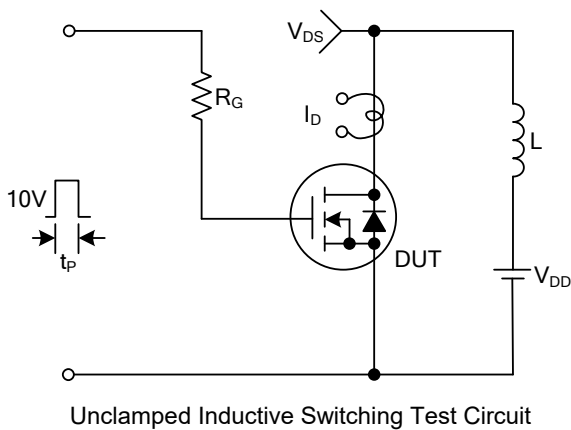
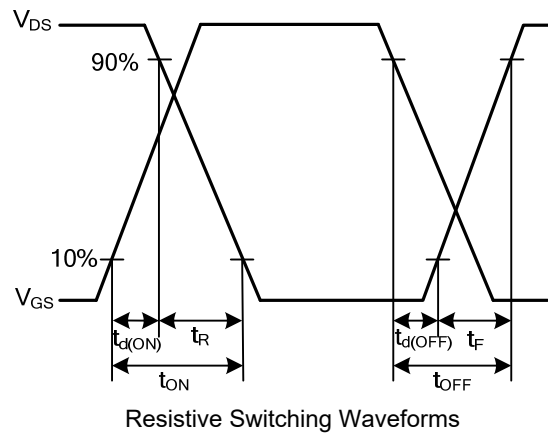
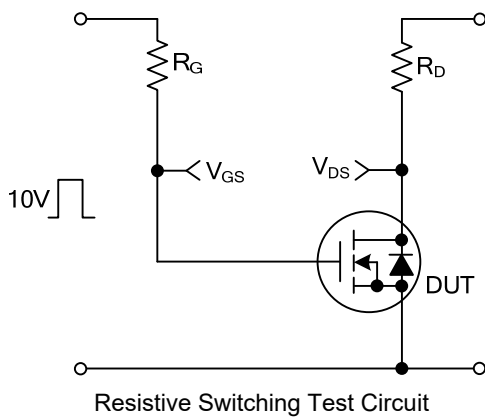
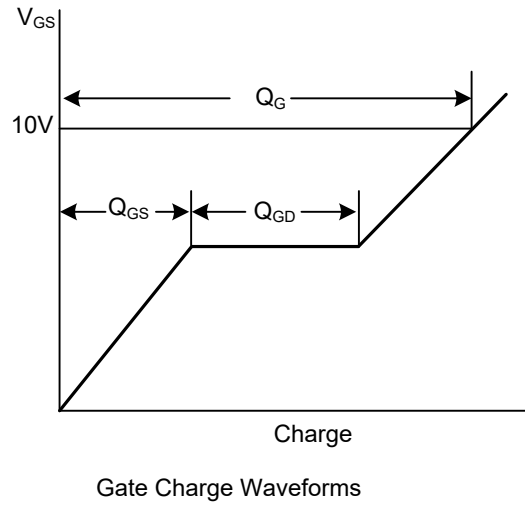
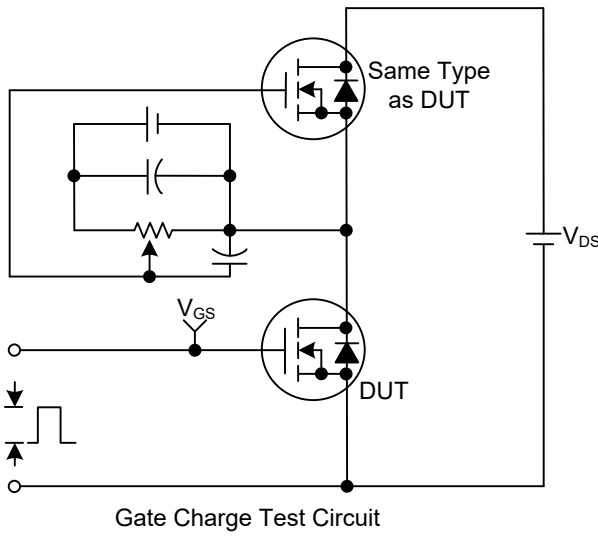
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

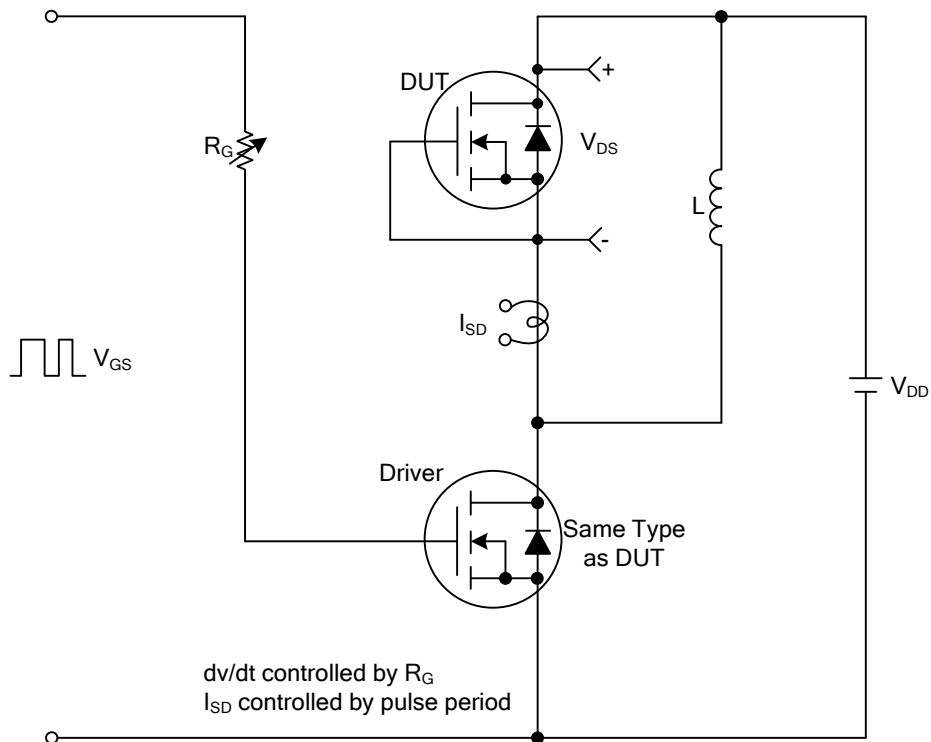
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	500			V	
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$			10	μA	
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA	
							Reverse
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.5		4.5	V	
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=10\text{A}$			0.22	Ω	
DYNAMIC CHARACTERISTICS							
Input Capacitance	C_{ISS}	$V_{DS}=50\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		1096		pF	
Output Capacitance	C_{OSS}				239		pF
Reverse Transfer Capacitance	C_{RSS}				20		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)	Q_G	$V_{DS}=400\text{V}$, $V_{GS}=10\text{V}$, $I_D=20\text{A}$, (Note 1, 2)		51		nC	
Gate to Source Charge	Q_{GS}			12		nC	
Gate to Drain Charge	Q_{GD}			24		nC	
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=100\text{V}$, $V_{GS}=10\text{V}$, $I_D=20\text{A}$, $R_G=25\Omega$ (Note 1, 2)		18		nS	
Rise Time	t_R			32		nS	
Turn-OFF Delay Time	$t_{D(OFF)}$			140		nS	
Fall-Time	t_F			47		nS	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current	I_S				20	A	
Maximum Body-Diode Pulsed Current	I_{SM}				60	A	
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$V_{GS}=0\text{V}$, $I_S=20\text{A}$			1.4	V	
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$V_{GS}=0\text{V}$, $I_S=20\text{A}$,		250		nS	
Body Diode Reverse Recovery Charge	Q_{rr}	$dI_r/dt=100\text{A}/\mu\text{s}$ (Note1)		2.3		μC	

- Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.
 2. Essentially independent of operating ambient temperature.

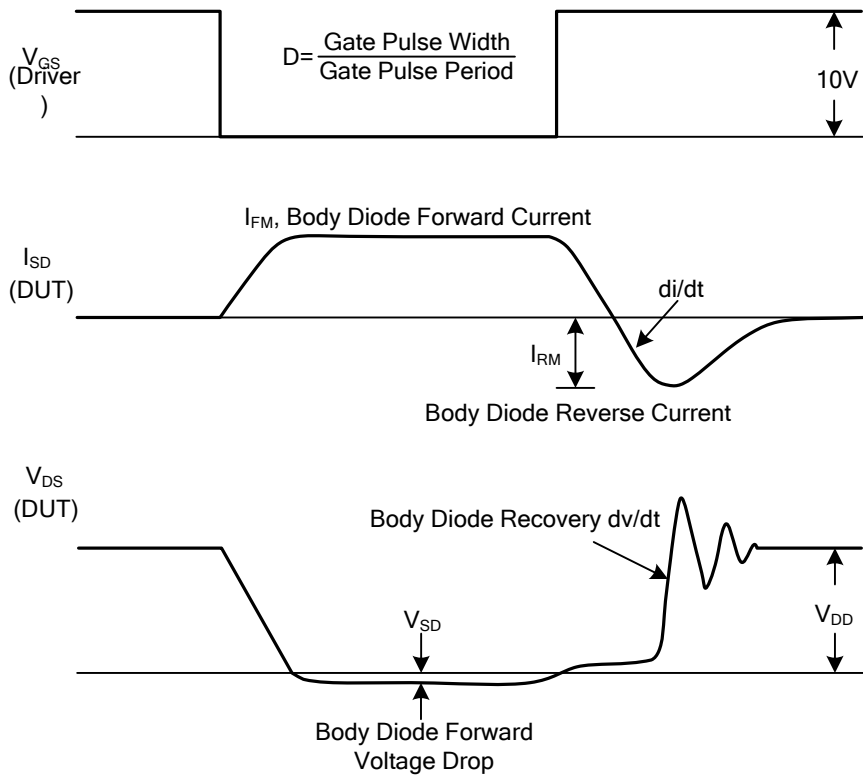
■ TEST CIRCUITS AND WAVEFORMS



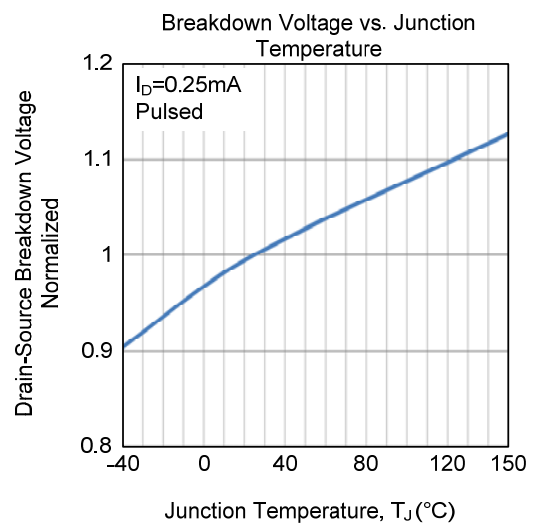
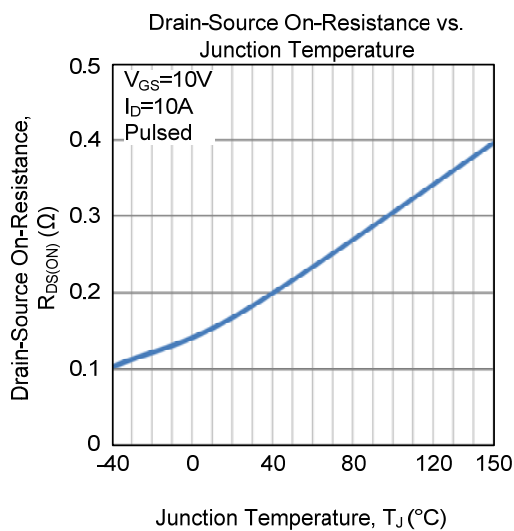
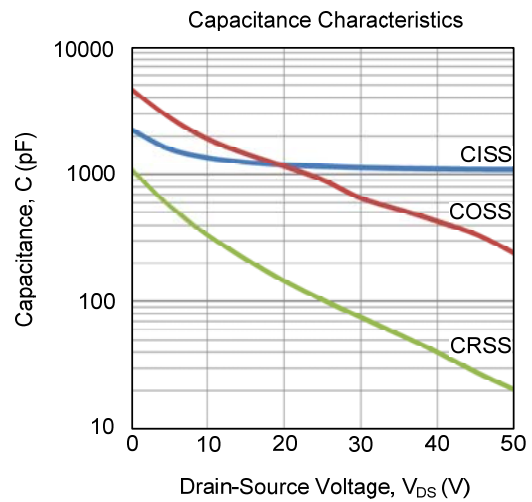
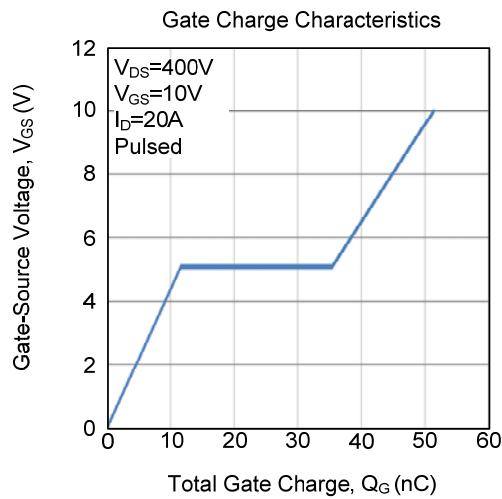
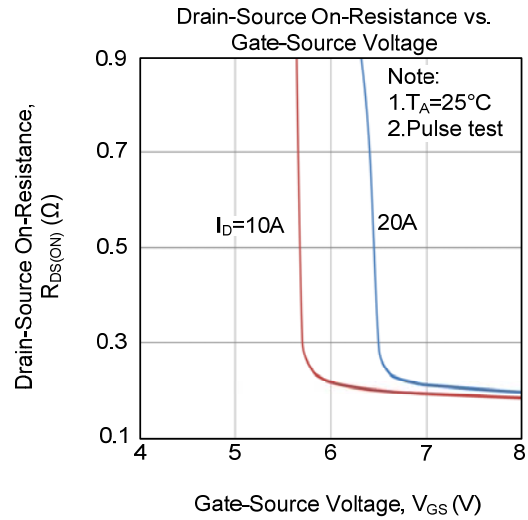
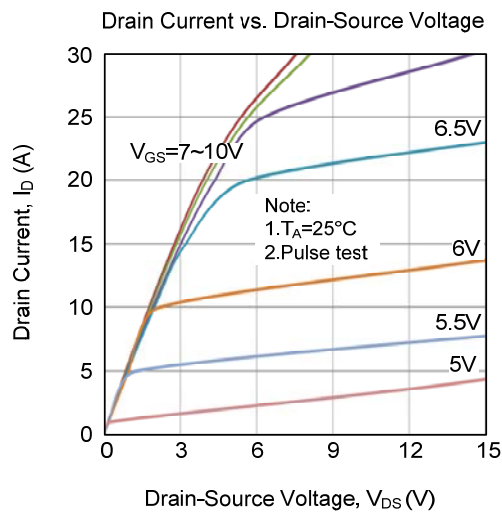
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



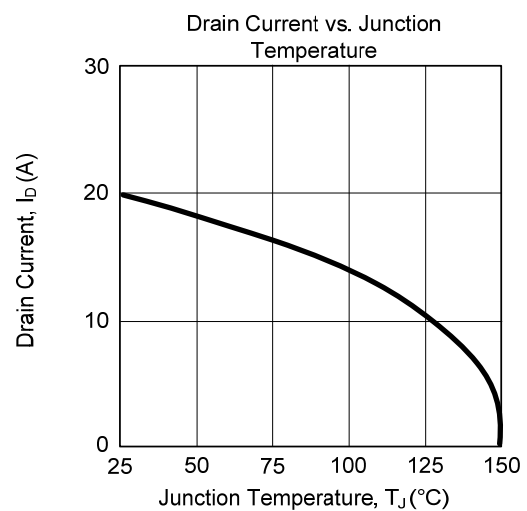
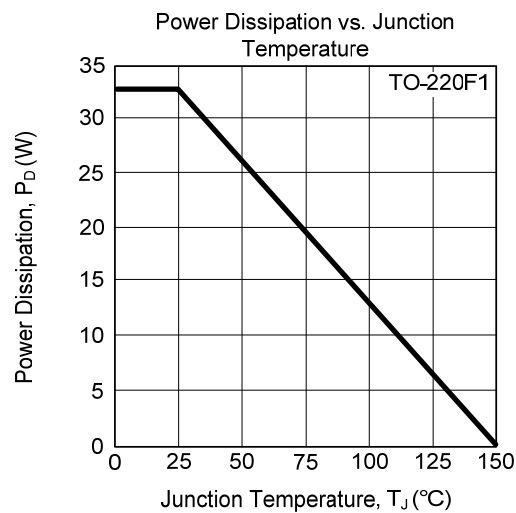
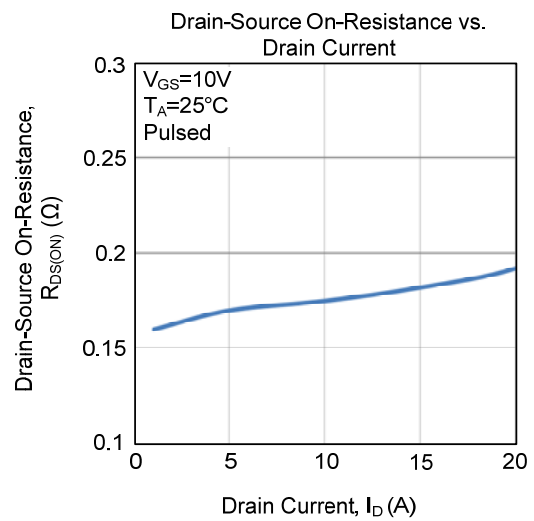
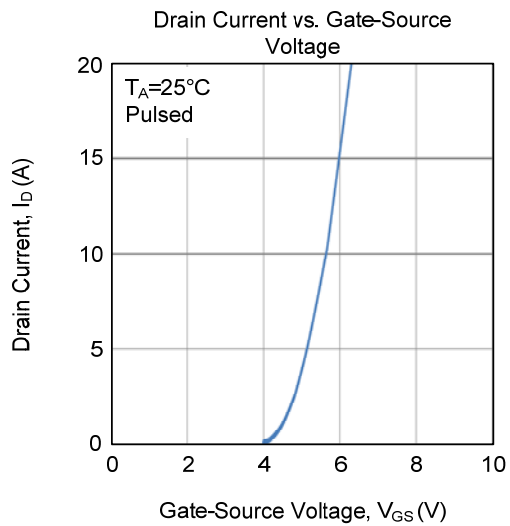
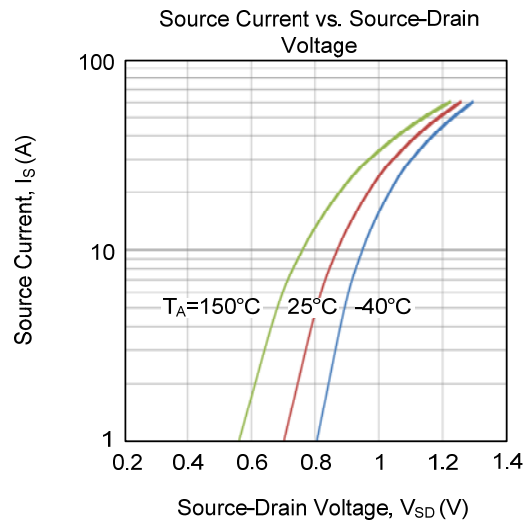
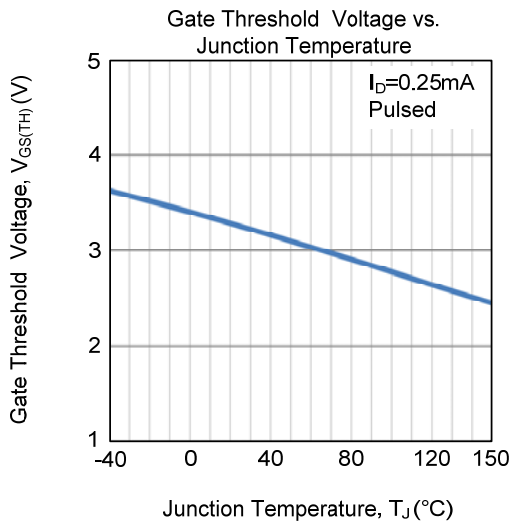
Peak Diode Recovery dv/dt Test Circuit & Waveforms



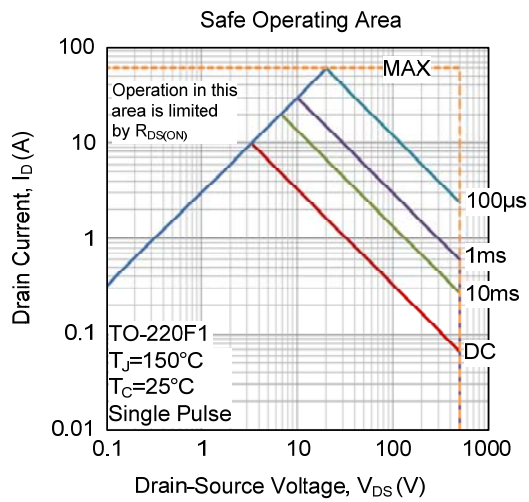
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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