



6NM120

Power MOSFET

6.0A, 1200V N-CHANNEL SUPER-JUNCTION MOSFET

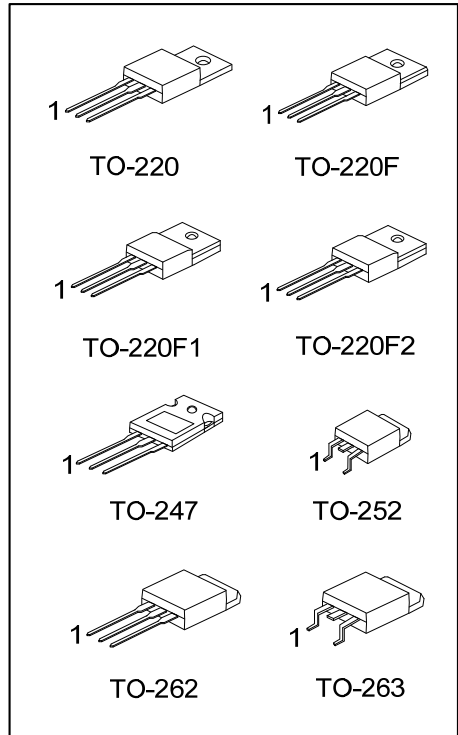
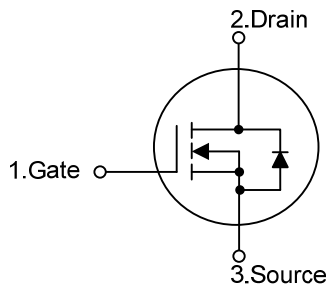
DESCRIPTION

The UTC **6NM120** 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

- * $R_{DS(ON)} \leq 1.9 \Omega$ @ $V_{GS}=10V$, $I_D=3.0A$
- * High Switching Speed

SYMBOL



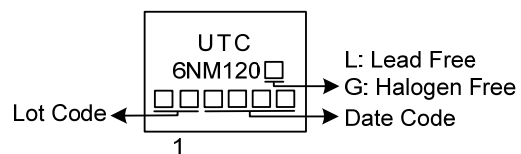
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6NM120L-TA3-T	6NM120G-TA3-T	TO-220	G	D	S	Tube
6NM120L-TF1-T	6NM120G-TF1-T	TO-220F1	G	D	S	Tube
6NM120L-TF2-T	6NM120G-TF2-T	TO-220F2	G	D	S	Tube
6NM120L-TF3-T	6NM120G-TF3-T	TO-220F	G	D	S	Tube
6NM120L-TN3-R	6NM120G-TN3-R	TO-252	G	D	S	Tape Reel
6NM120L-T2Q-T	6NM120G-T2Q-T	TO-262	G	D	S	Tube
6NM120L-TQ2-T	6NM120G-TQ2-T	TO-263	G	D	S	Tube
6NM120L-TQ2-R	6NM120G-TQ2-R	TO-263	G	D	S	Tape Reel
6NM120L-T47-T	6NM120G-T47-T	TO-247	G	D	S	Tube

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

6NM120G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2 TF3: TO-220F, T47: TO-247, TN3: TO-252 T2Q: TO-262, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage		V_{GS}	± 30	V
Continuous Drain Current	Continuous	I_D	6	A
	Pulsed	I_{DM}	12	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	100	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.9	V/ns
Power Dissipation	TO-220 TO-262 TO-263	P_D	70	W
	TO-220F TO-220F1 TO-220F2		27	W
	TO-247		90	W
	TO-252		38	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°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. $L = 100\text{mH}$, $I_{AS} = 1.41\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 6.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220 TO-220F TO-220F1 TO-220F2 TO-262 TO-263	θ_{JA}	62.5	°C/W
	TO-247		40	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220 TO-262 TO-263	θ_{JC}	1.79	°C/W
	TO-220F TO-220F1 TO-220F2		4.62	°C/W
	TO-247		1.39	°C/W
	TO-252		3.29 (Note)	°C/W

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

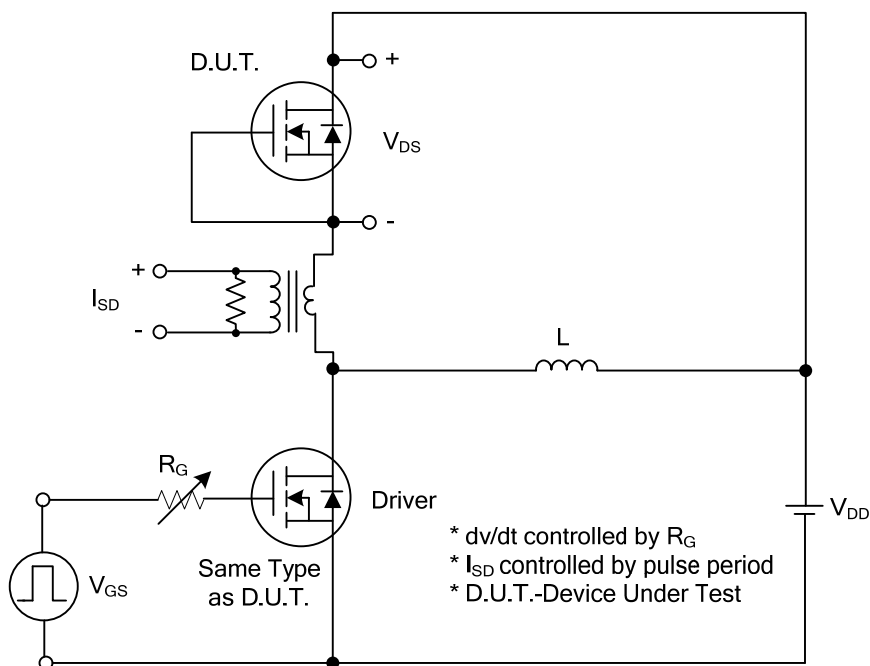
■ ELECTRICAL CHARACTERISTICS

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	1200			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =1200V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.5		4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3.0A			1.9	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =50V, f=1.0MHz		665		pF
Output Capacitance		C _{OSS}			40		pF
Reverse Transfer Capacitance		C _{RSS}			2.7		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =960V, V _{GS} =10V, I _D =6.0A (Note 1, 2)		29		nC
Gate to Source Charge		Q _{GS}			7.6		nC
Gate to Drain Charge		Q _{GD}			9		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =6.0A, R _G =25Ω (Note 1, 2)		9		ns
Rise Time		t _R			18.5		ns
Turn-OFF Delay Time		t _{D(OFF)}			80		ns
Fall-Time		t _F			40		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				6	A
Maximum Body-Diode Pulsed Current		I _{SM}				12	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =6.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =6.0A, V _{GS} =0V,		550		ns
Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs (Note 1)		7		μC

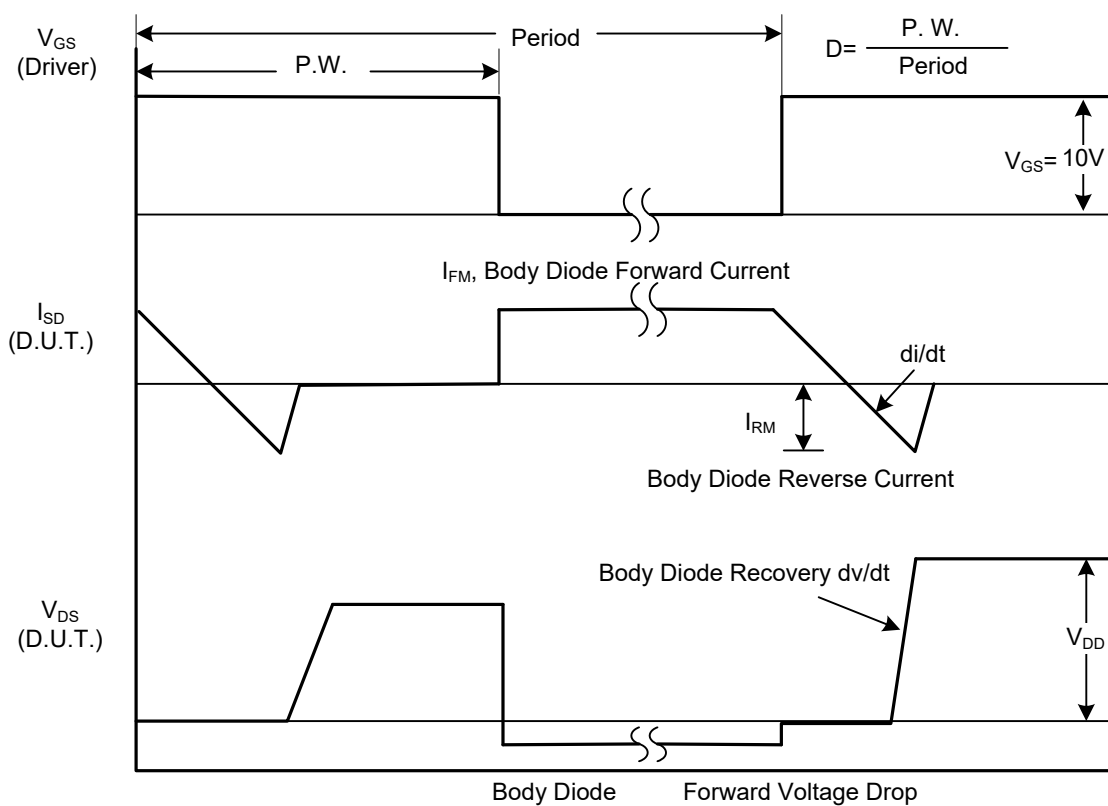
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

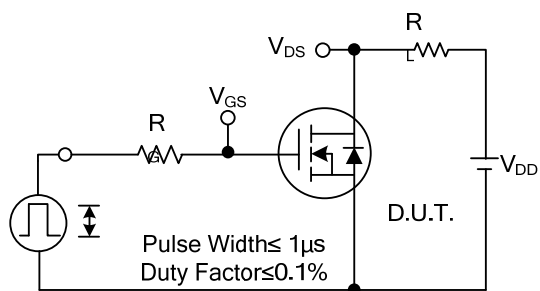


Peak Diode Recovery dv/dt Test Circuit

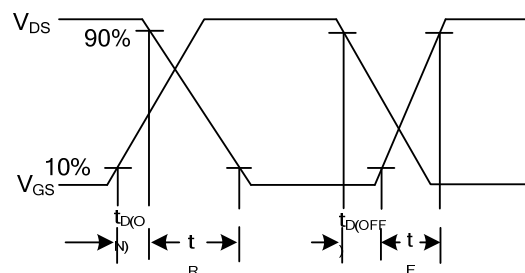


Peak Diode Recovery dv/dt Waveforms

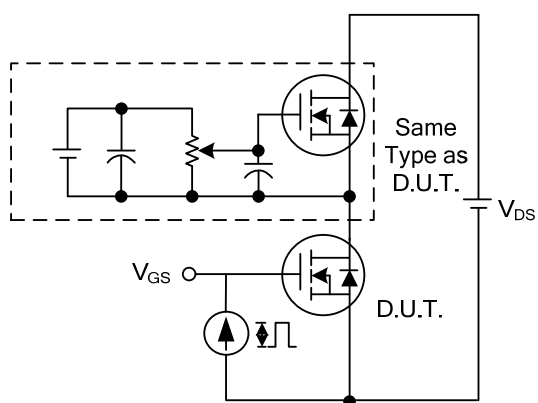
■ TEST CIRCUITS AND WAVEFORMS



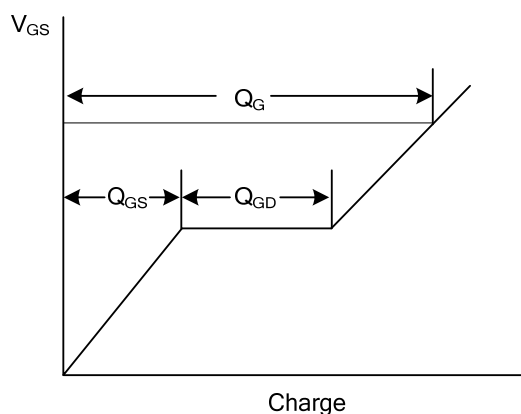
Switching Test Circuit



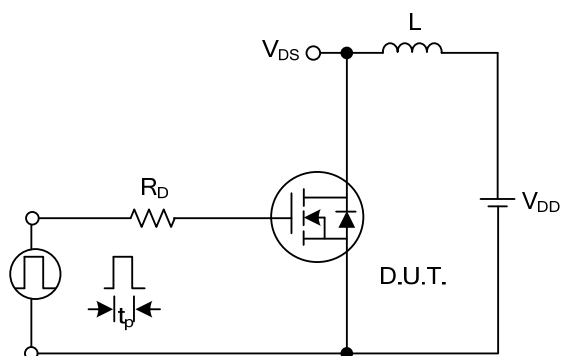
Switching Waveforms



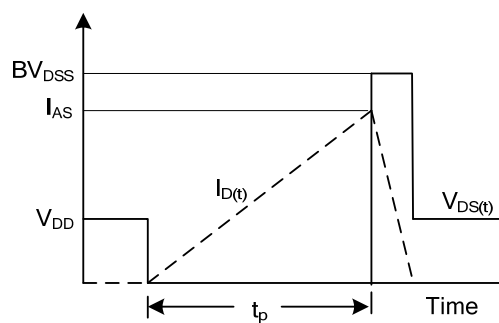
Gate Charge Test Circuit



Gate Charge Waveform

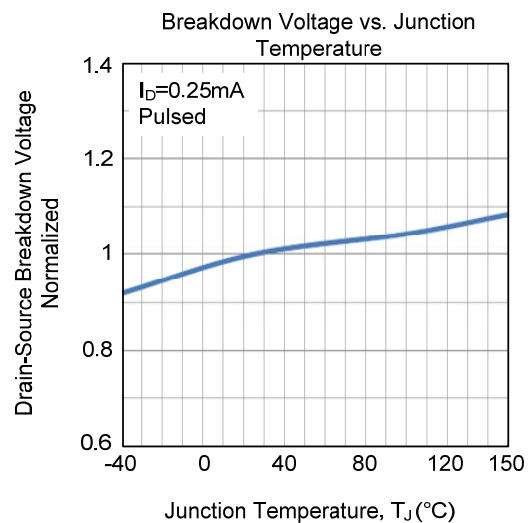
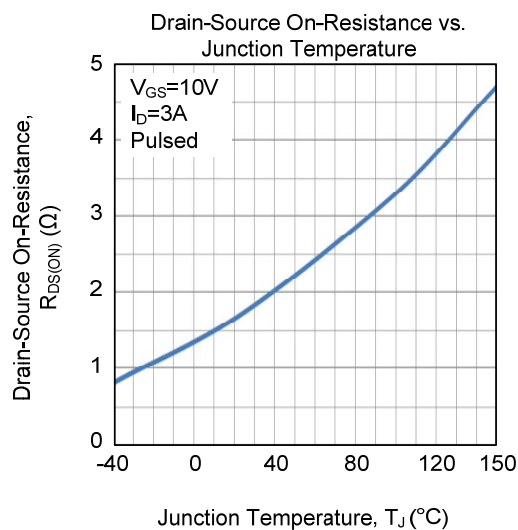
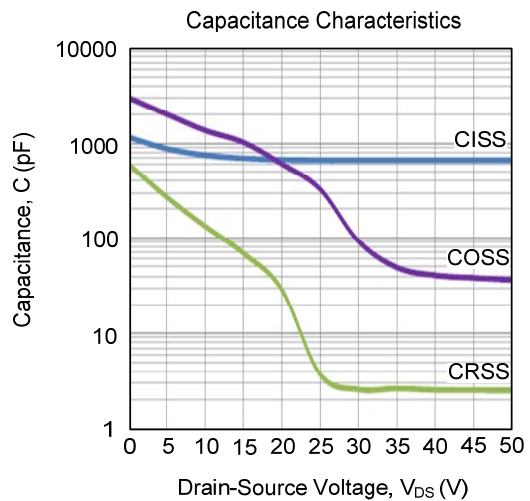
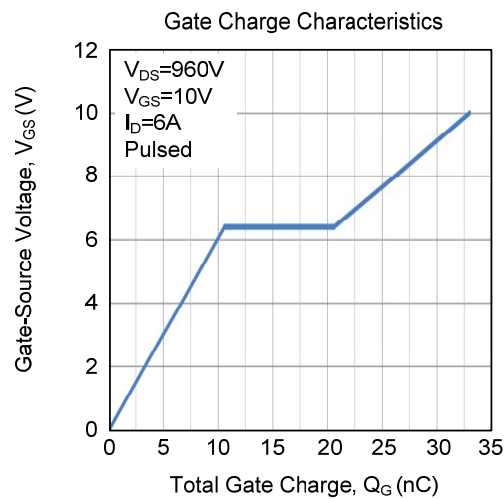
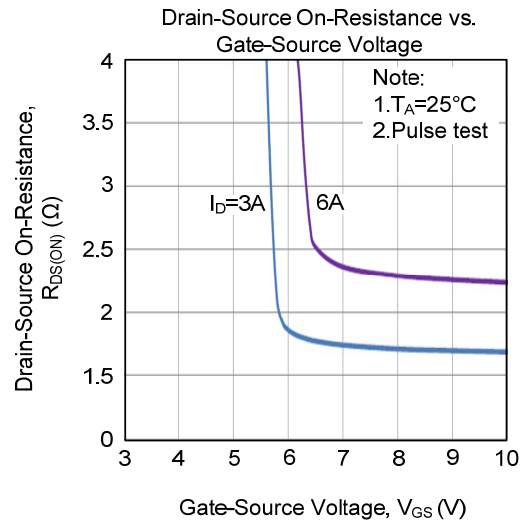
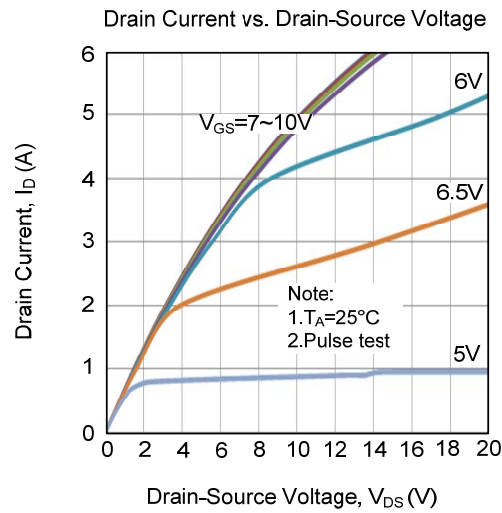


Unclamped Inductive Switching Test Circuit

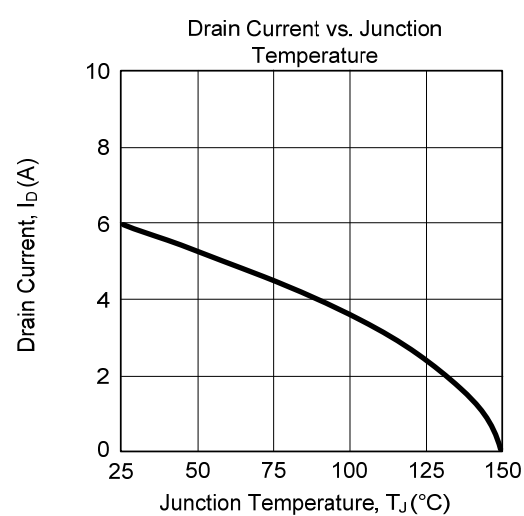
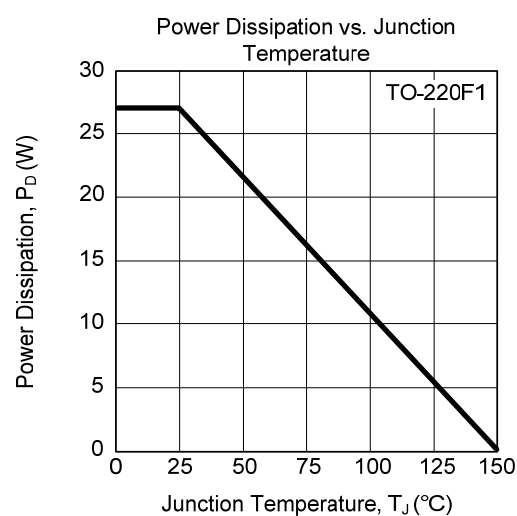
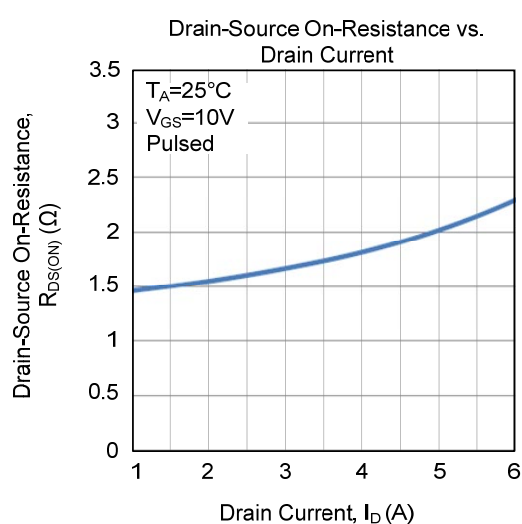
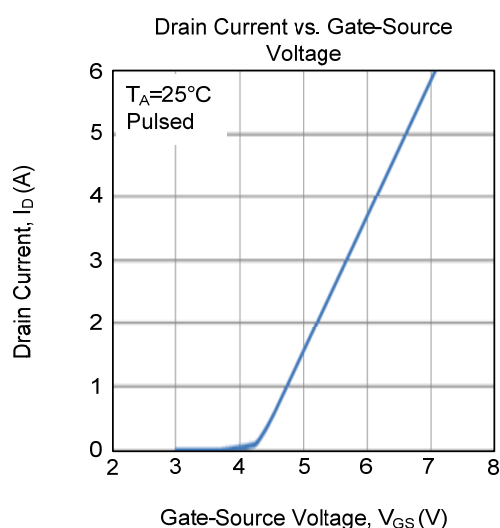
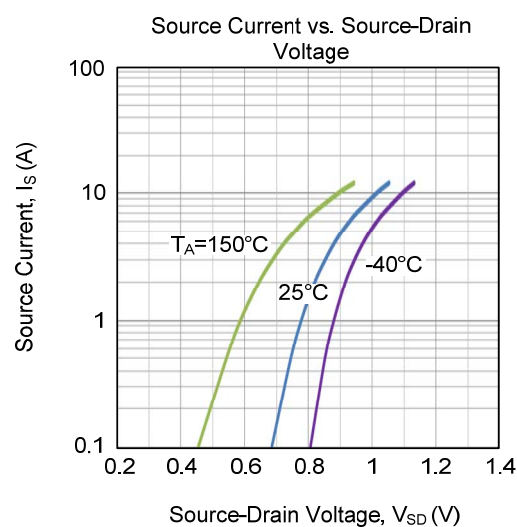
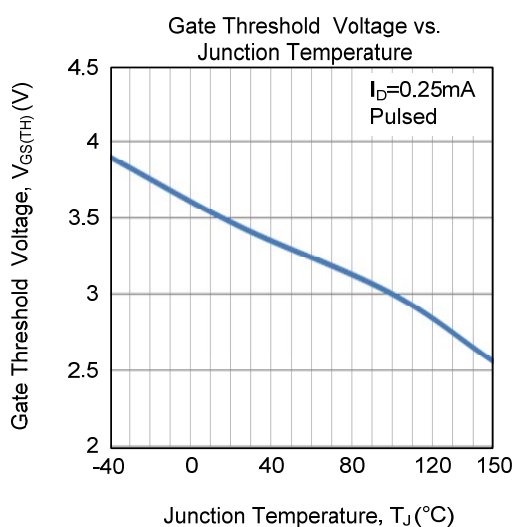


Unclamped Inductive Switching Waveforms

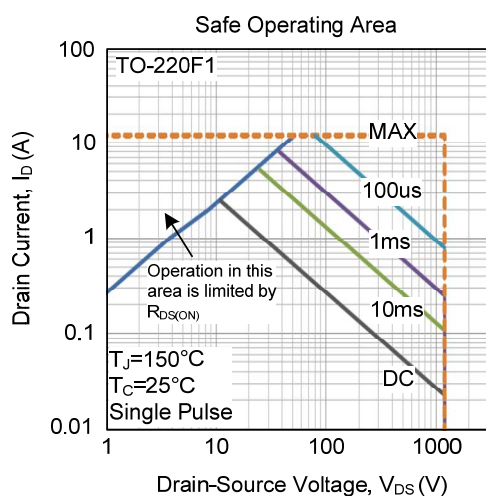
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



TYPICAL CHARACTERISTICS (Cont.)



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