



12N60K-MT

Power MOSFET

12A, 600V N-CHANNEL POWER MOSFET

DESCRIPTION

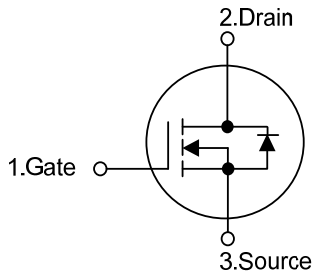
The UTC **12N60K-MT** are N-Channel enhancement mode power field effect transistors (MOSFET) which are produced using UTC's proprietary, planar stripe, DMOS technology.

These devices are suited for high efficiency mode power supply. To minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode the advanced technology has been especially tailored.

FEATURES

- * $R_{DS(ON)} \leq 0.70\Omega$ @ $V_{GS}=10V, I_D=6.0A$
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL

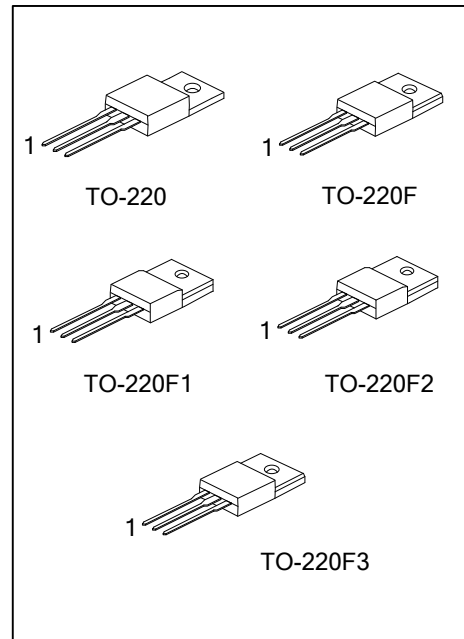


ORDERING INFORMATION

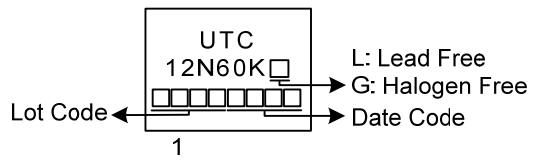
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N60KL-TA3-T	12N60KG-TA3-T	TO-220	G	D	S	Tube
12N60KL-TF3-T	12N60KG-TF3-T	TO-220F	G	D	S	Tube
12N60KL-TF1-T	12N60KG-TF1-T	TO-220F1	G	D	S	Tube
12N60KL-TF2-T	12N60KG-TF2-T	TO-220F2	G	D	S	Tube
12N60KL-TF3T-T	12N60KG-TF3T-T	TO-220F3	G	D	S	Tube

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

<p>12N60KG-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220F, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TF3T: TO-220F3 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	12	A
	Pulsed (Note 2)	I_{DM}	48	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	420	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.78	V/ns
Power Dissipation	TO-220	P_D	225	W
	TO-220F/TO-220F1		51	W
	TO-220F3		54	W
	TO-220F2			
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +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. $L = 5.8\text{mH}$, $I_{AS} = 12\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 12\text{A}$, $di/dt \leq 200\text{A/s}$, $V_{DD} \leq BV_{DSS}$ Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-220F1/TO-220F2			
	TO-220F3			
Junction to Case	TO-220	θ_{JC}	0.56	$^\circ\text{C/W}$
	TO-220F/TO-220F1		2.43	
	TO-220F3			
	TO-220F2		2.31	

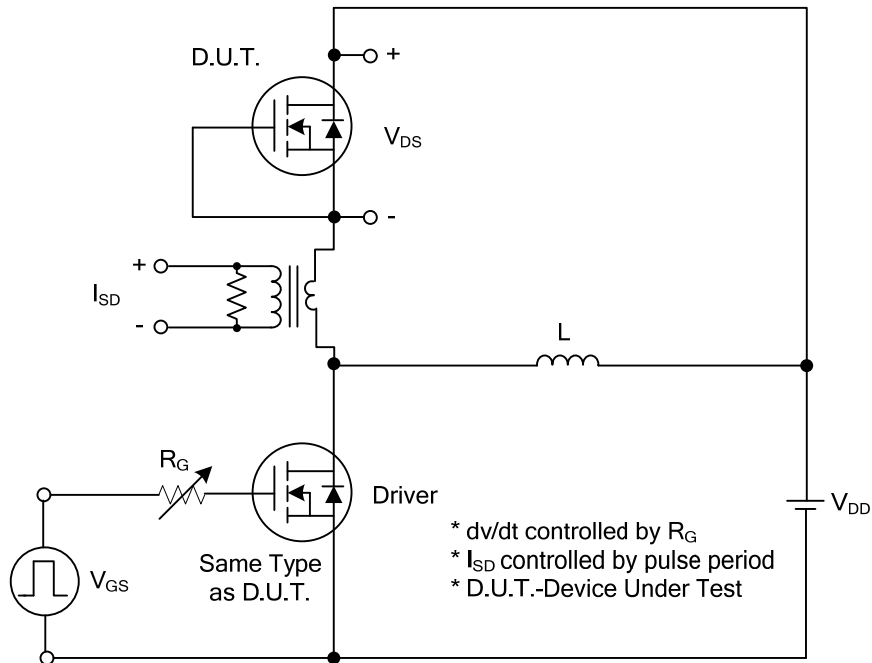
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	600			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±30V, V _{DS} =0V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.7		V/°C
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =6.0A		0.57	0.70	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		1880		pF
Output Capacitance	C _{OSS}			180		pF
Reverse Transfer Capacitance	C _{RSS}			10		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =300V, I _D =12A, V _{GS} =10V I _G =1mA(Note1,2)		38		nC
Gate-Source Charge	Q _{GS}			13		nC
Gate-Drain Charge	Q _{GD}			8		nC
Turn-On Delay Time	t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω (Note1,2)		90		ns
Turn-On Rise Time	t _R			109		ns
Turn-Off Delay Time	t _{D(OFF)}			190		ns
Turn-Off Fall Time	t _F			100		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				12	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				48	A
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =12A			1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =0.2A, di/dt=100A/μs		544		ns
Reverse Recovery Charge	Q _{rr}			5.9		μC

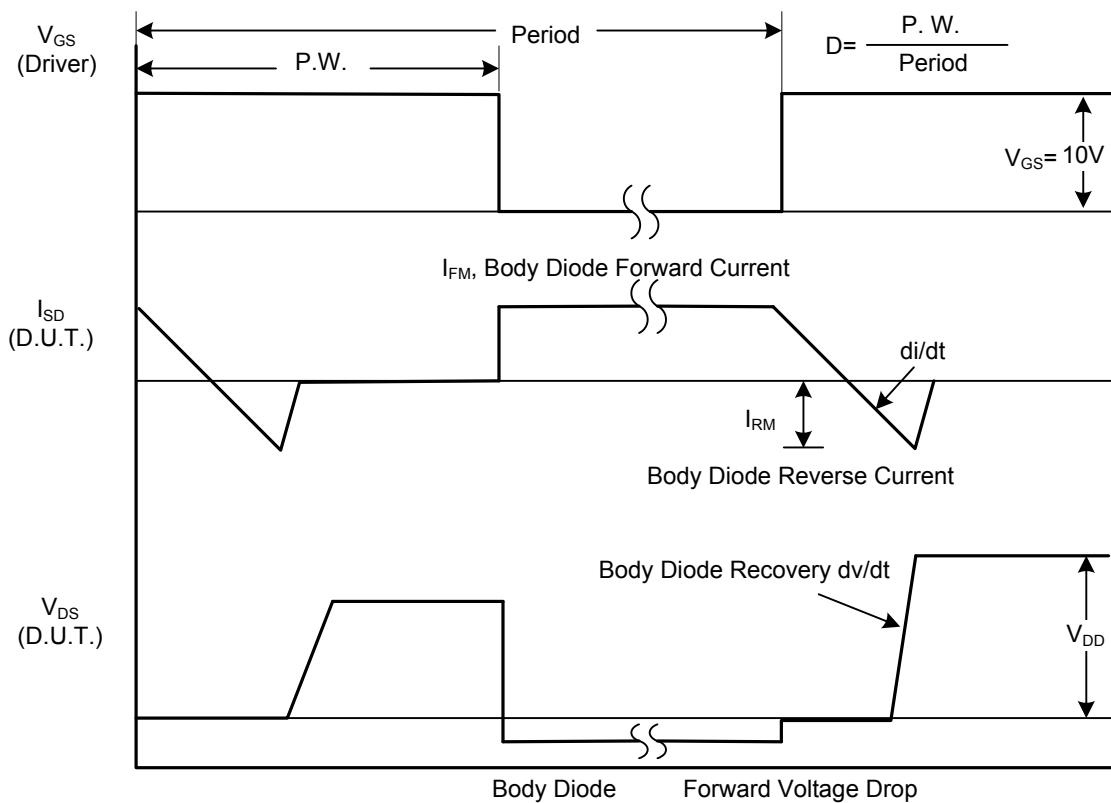
Notes: 1. Pulse Test : Pulse width ≤300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

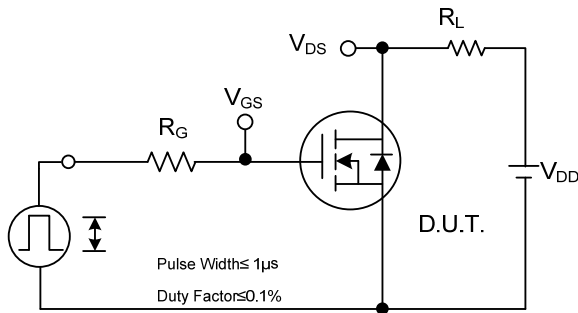


Peak Diode Recovery dv/dt Test Circuit

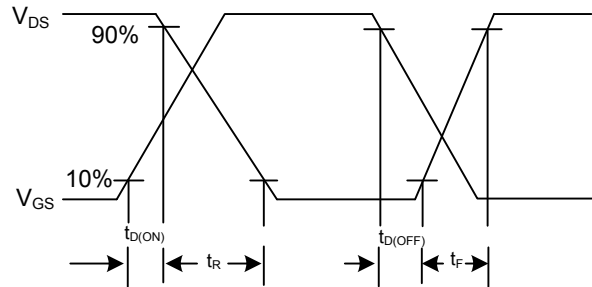


Peak Diode Recovery dv/dt Waveforms

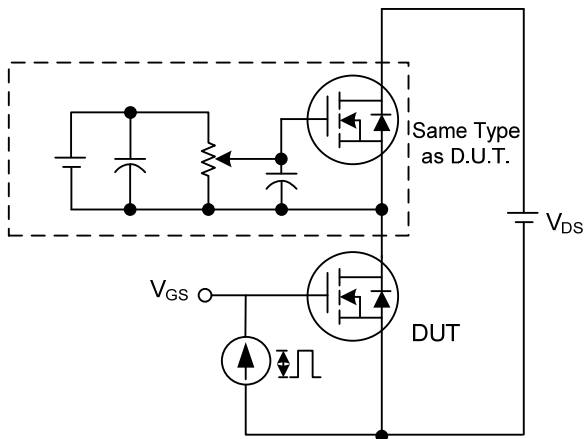
TEST CIRCUITS AND WAVEFORMS



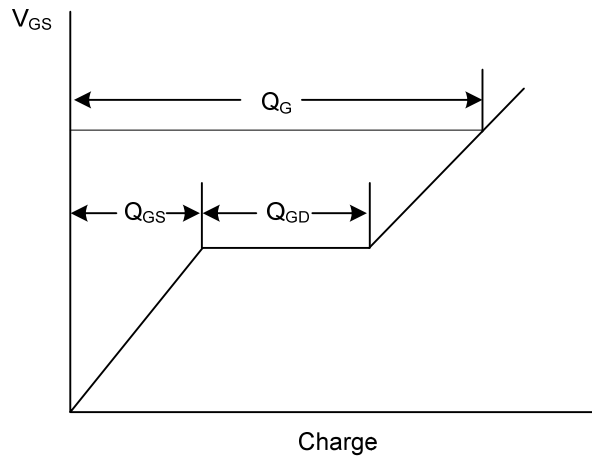
Switching Test Circuit



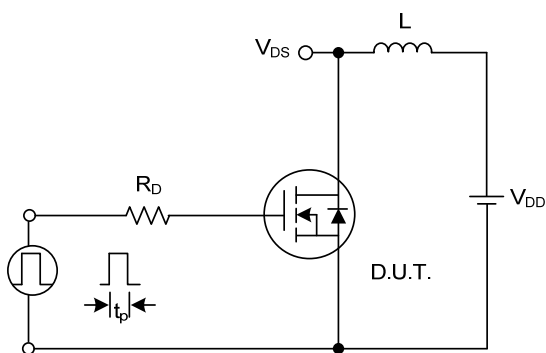
Switching Waveforms



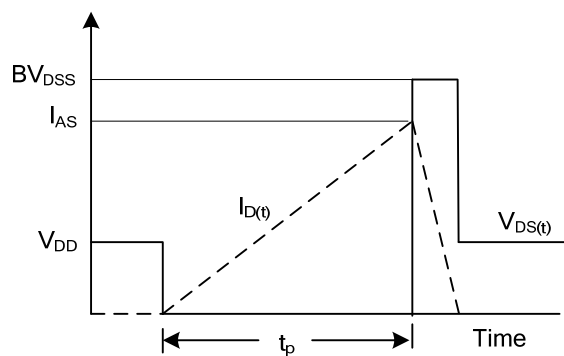
Gate Charge Test Circuit



Gate Charge Waveform

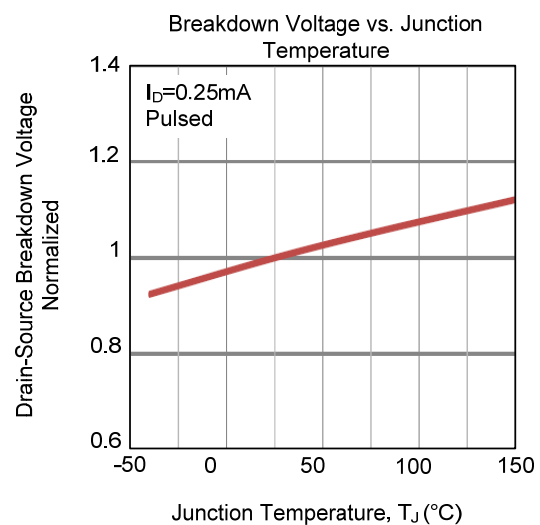
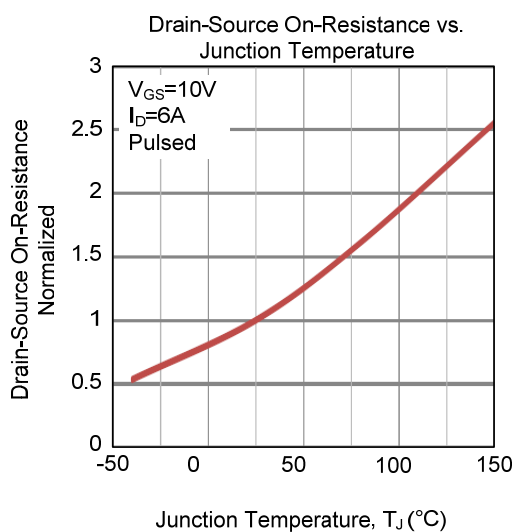
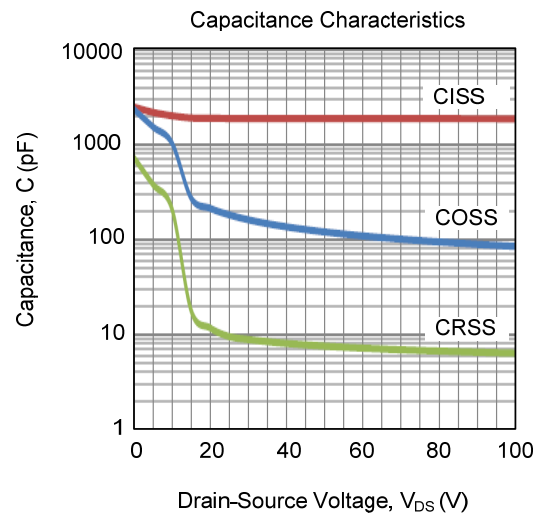
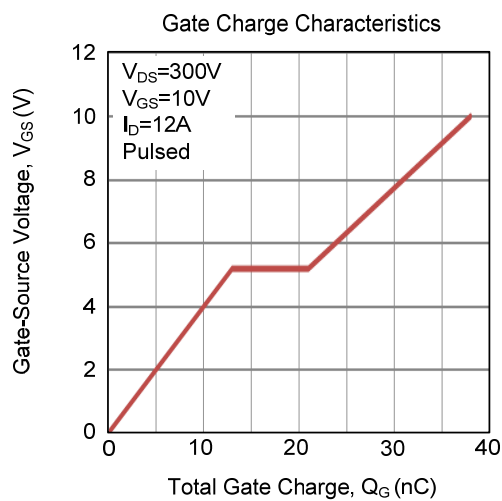
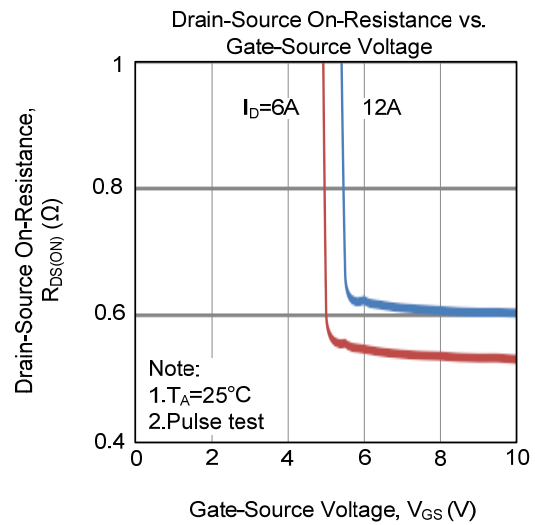
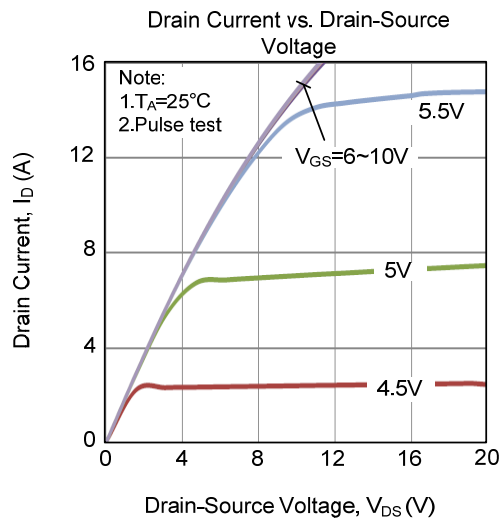


Unclamped Inductive Switching Test Circuit

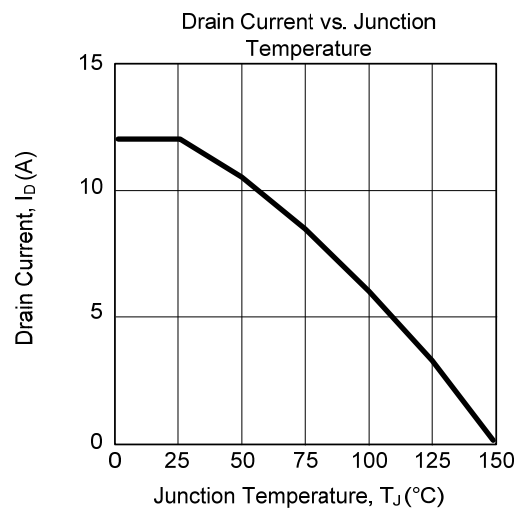
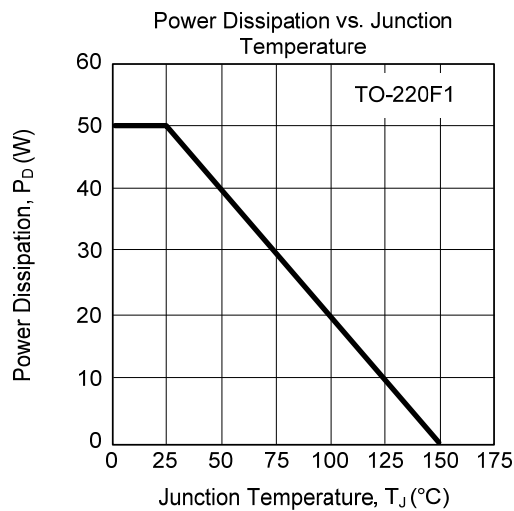
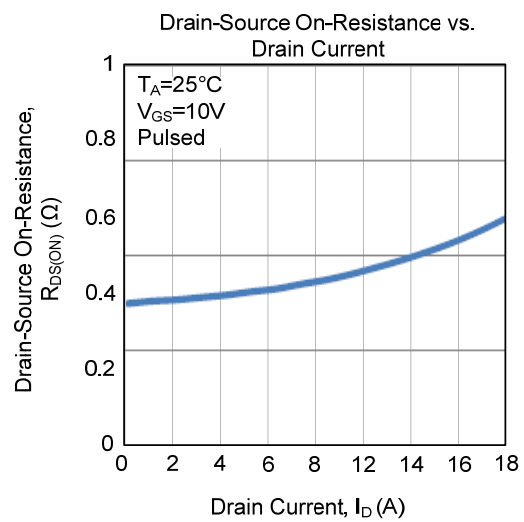
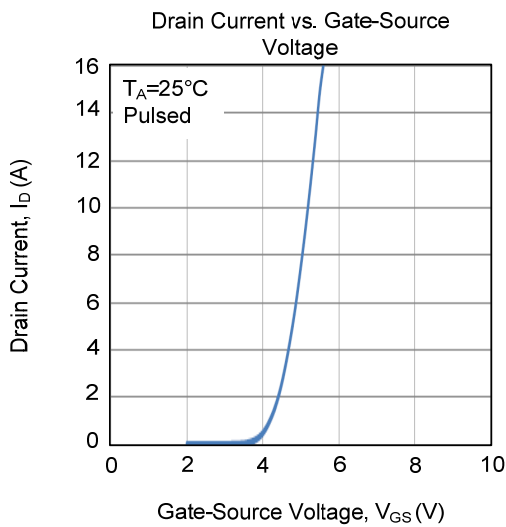
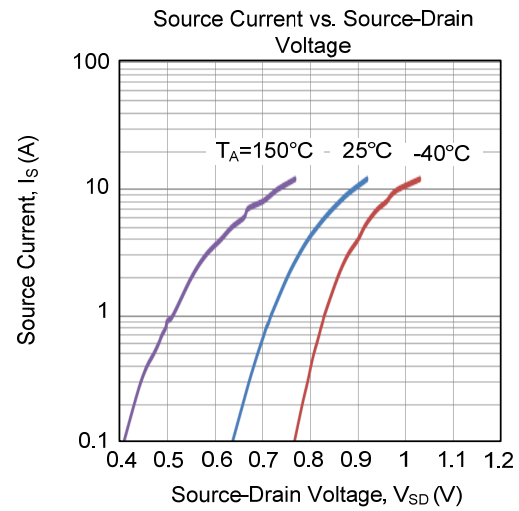
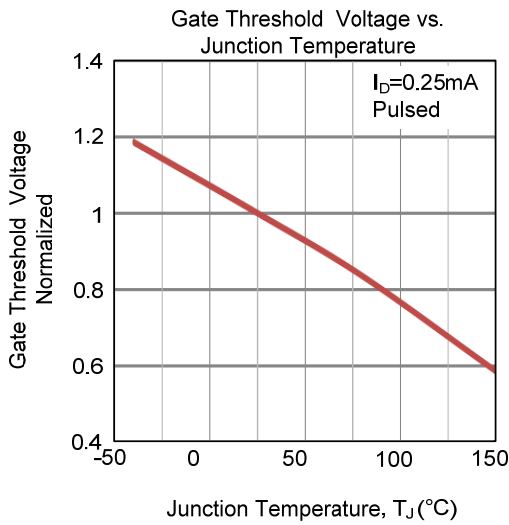


Unclamped Inductive Switching Waveforms

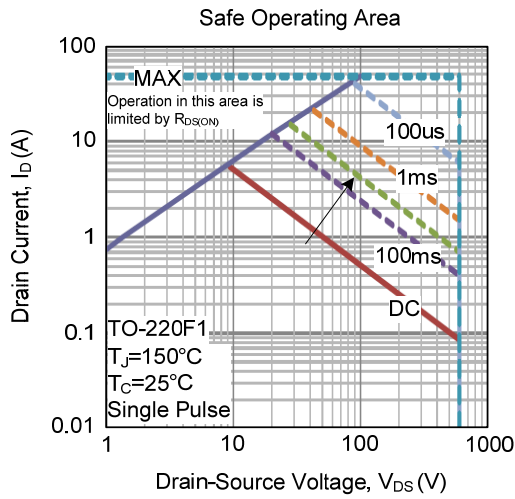
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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