



12N80

Power MOSFET

12A, 800V N-CHANNEL POWER MOSFET

■ DESCRIPTION

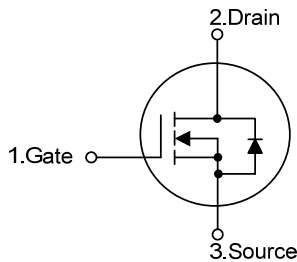
The UTC **12N80** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **12N80** is universally applied in high efficiency switch mode power supply.

■ FEATURES

- * $R_{DS(on)} \leq 1.0\Omega$ @ $V_{GS}=10V, I_D=6.0A$
- * High switching speed
- * Improved dv/dt capability
- * 100% avalanche tested

■ SYMBOL

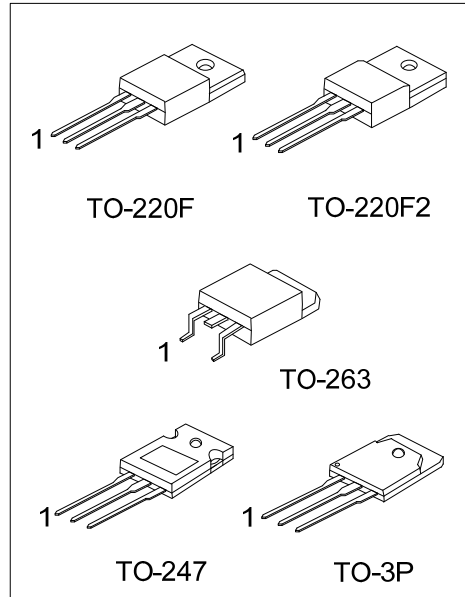


■ ORDERING INFORMATION

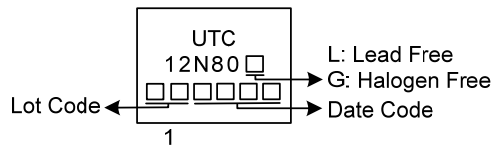
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N80L-TF2-T	12N80G-TF2-T	TO-220F2	G	D	S	Tube
12N80L-TF3-T	12N80G-TF3-T	TO-220F	G	D	S	Tube
12N80L-TQ2-T	12N80G-TQ2-T	TO-263	G	D	S	Tube
12N80L-TQ2-R	12N80G-TQ2-R	TO-263	G	D	S	Tape Reel
12N80L-T47-T	12N80G-T47-T	TO-247	G	D	S	Tube
12N80L-T3P-T	12N80G-T3P-T	TO-3P	G	D	S	Tube

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

<p>12N80G-TF2-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TF2: TO-220F2, TF3: TO-220F, TQ2: TO-263 T3P: TO-3P, T47: TO-247 (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}	800	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	12	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Energy		E_{AS}	884	mJ
Power Dissipation	TO-220F/TO-220F2	P_D	35	W
	TO-247		240	W
	TO-3P		260	W
	TO-263		150	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. $L=10\text{mH}$, $I_{AS}=13.3\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F2	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-247		50	$^\circ\text{C/W}$
	TO-3P		40	$^\circ\text{C/W}$
	TO-263		62.5	$^\circ\text{C/W}$
Junction to Case	TO-220F/TO-220F2	θ_{JC}	3.6	$^\circ\text{C/W}$
	TO-247		0.52	$^\circ\text{C/W}$
	TO-3P		0.48	$^\circ\text{C/W}$
	TO-263		0.75	$^\circ\text{C/W}$

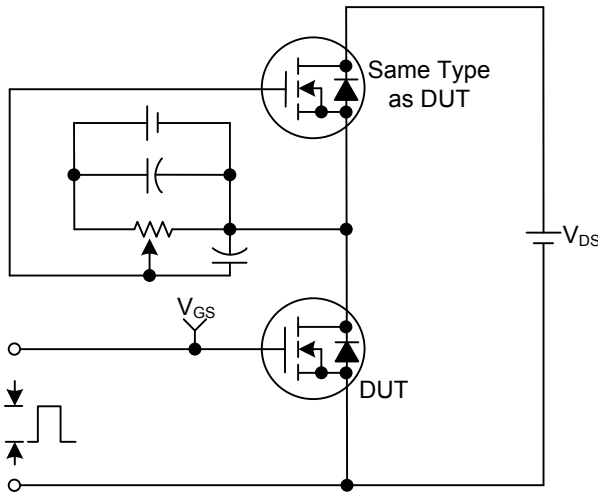
■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	800			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=800\text{V}, V_{GS}=0\text{V}$			10	μA
		$V_{DS}=640\text{V}, T_C=125^\circ\text{C}$			100	
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse					
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	3.0		5.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=6.0\text{A}$			1.0	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1.0\text{MHz}$		2200		pF
Output Capacitance	C_{OSS}			200		pF
Reverse Transfer Capacitance	C_{RSS}			30		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{DS}=400\text{V}, V_{GS}=10\text{V}, I_D=12\text{A}$ $I_G=1\text{mA}$ (Note 1, 2)		61		nC
Gate to Source Charge	Q_{GS}			12		nC
Gate to Drain Charge	Q_{GD}			21		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=100\text{V}, V_{GS}=10\text{V}, I_D=12\text{A},$ $R_G=25\Omega$ (Note 1, 2)		38		ns
Rise Time	t_R			25		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			180		ns
Fall-Time	t_F			64		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}				24	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S=12\text{A}, V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$V_{GS}=0\text{V}, I_S=12\text{A}, dI_F/dt=100\text{A}/\mu\text{s}$ (Note 1)		630		ns
Body Diode Reverse Recovery Charge	Q_{rr}				12	

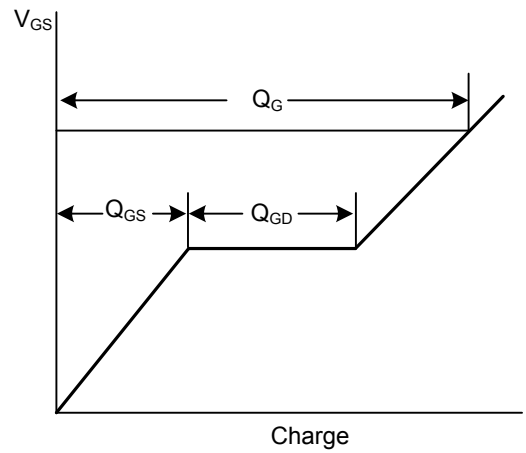
Notes: 1. Pulse Test: Pulse width $\leq 250\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

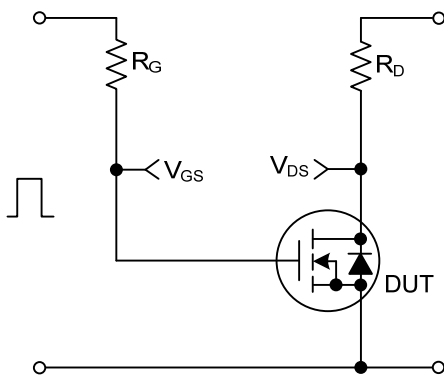
■ TEST CIRCUITS AND WAVEFORMS



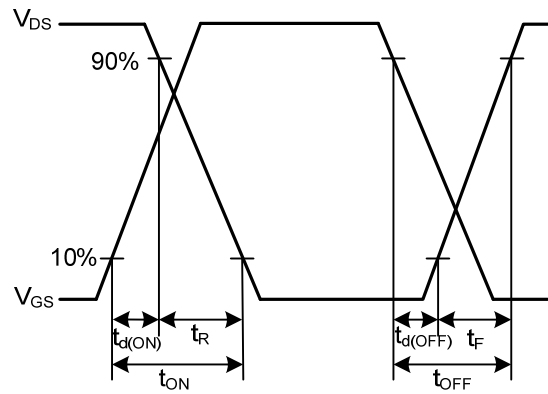
Gate Charge Test Circuit



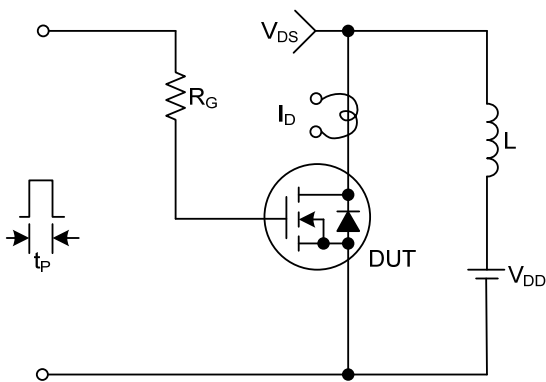
Gate Charge Waveforms



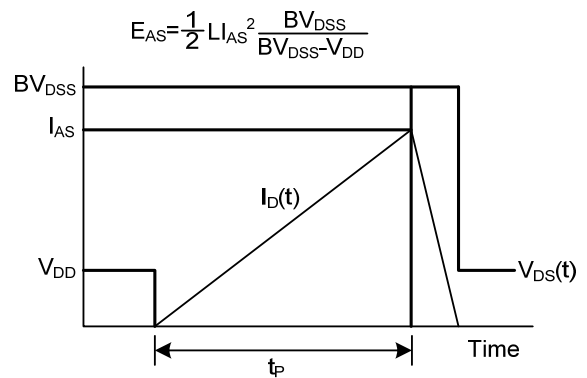
Resistive Switching Test Circuit



Resistive Switching Waveforms

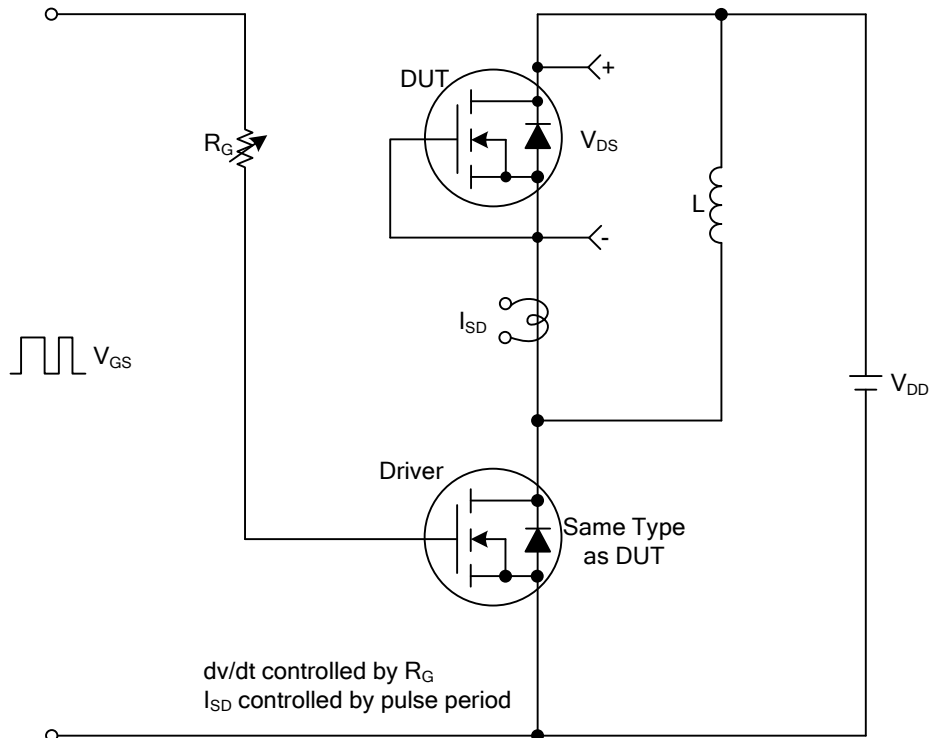


Unclamped Inductive Switching Test Circuit

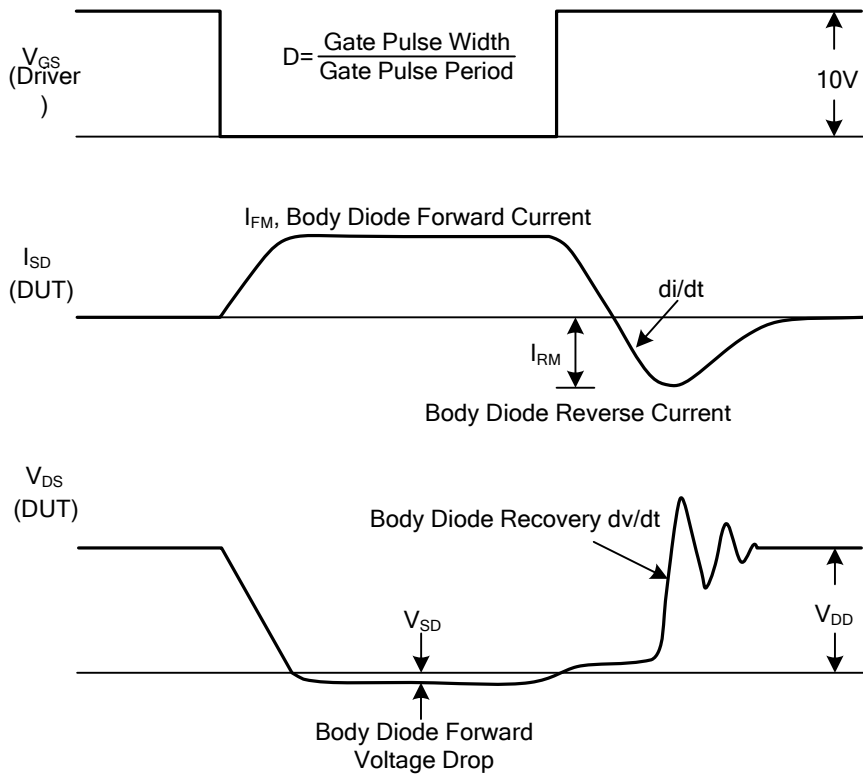


Unclamped Inductive Switching Waveforms

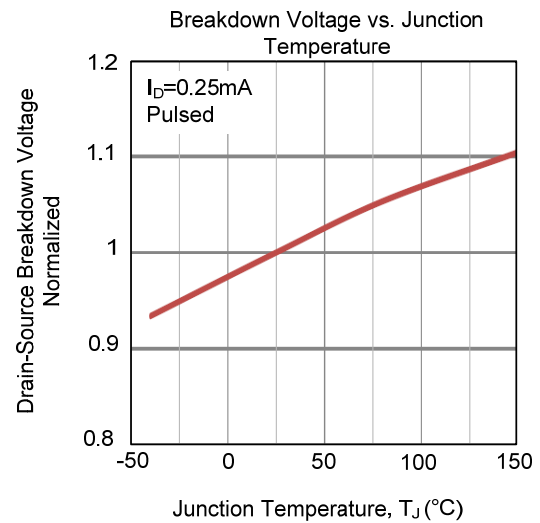
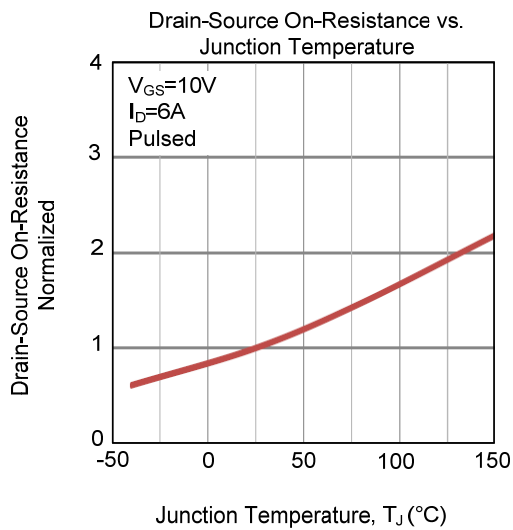
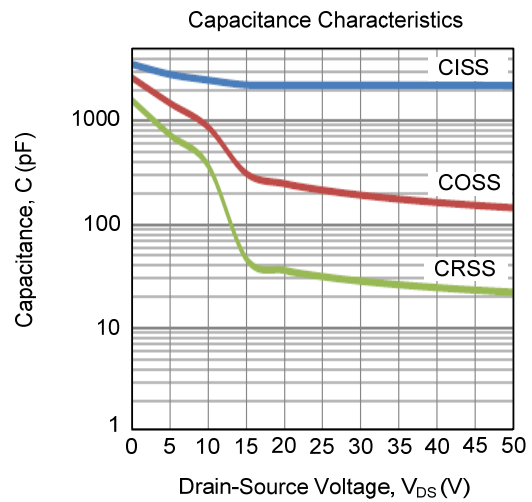
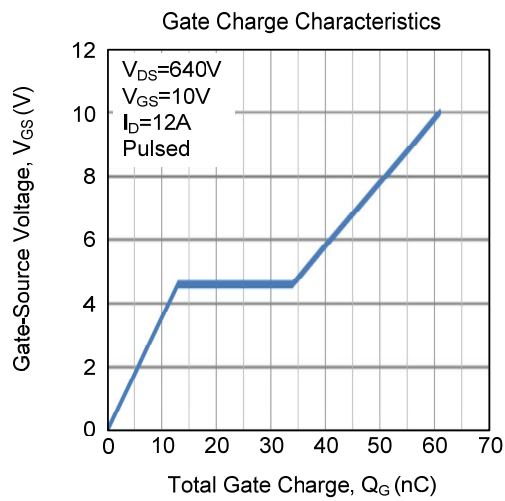
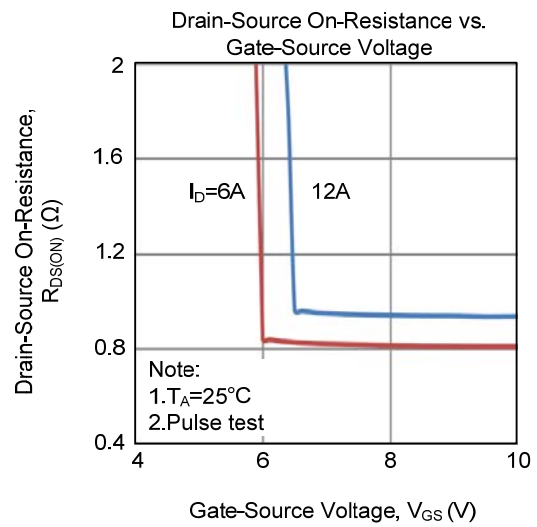
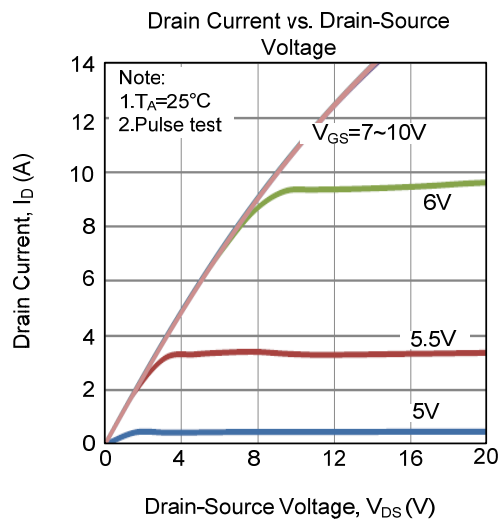
■ TEST CIRCUITS AND WAVEFORMS



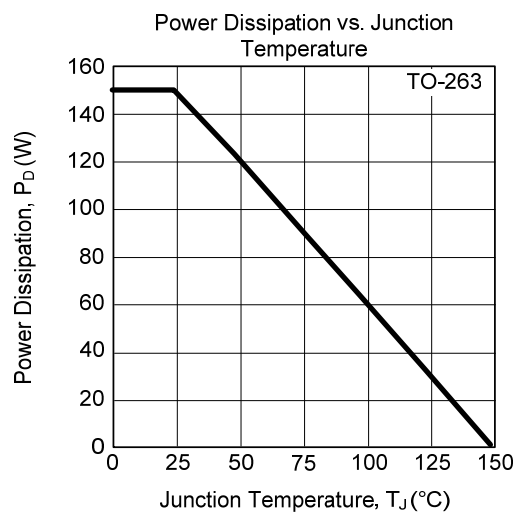
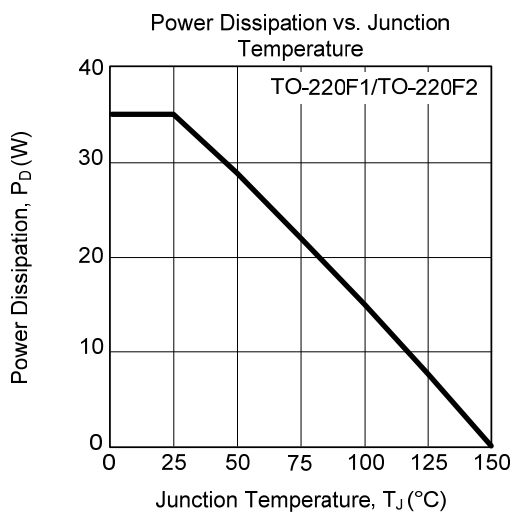
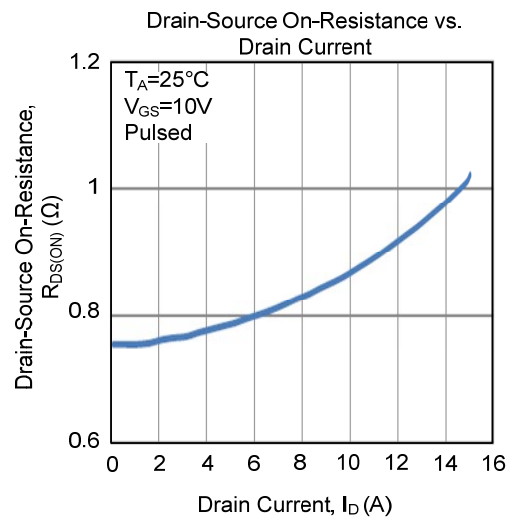
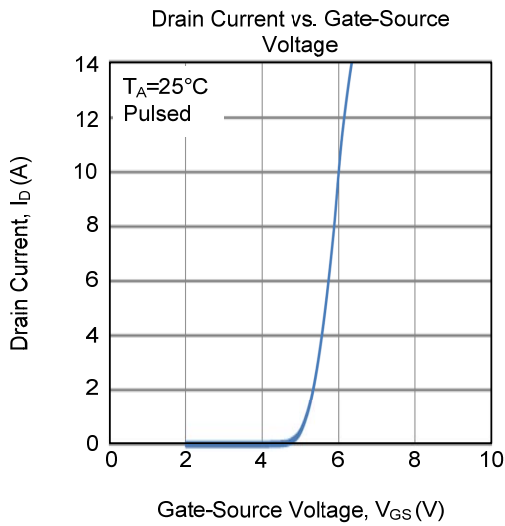
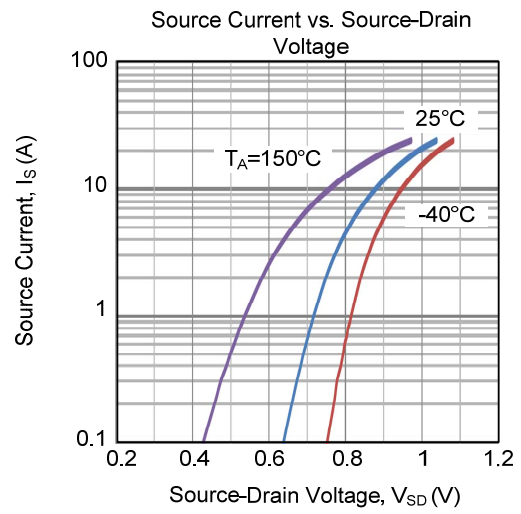
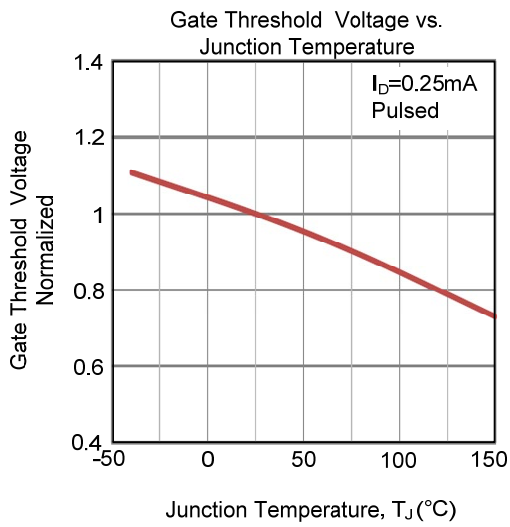
Peak Diode Recovery dv/dt Test Circuit & Waveforms



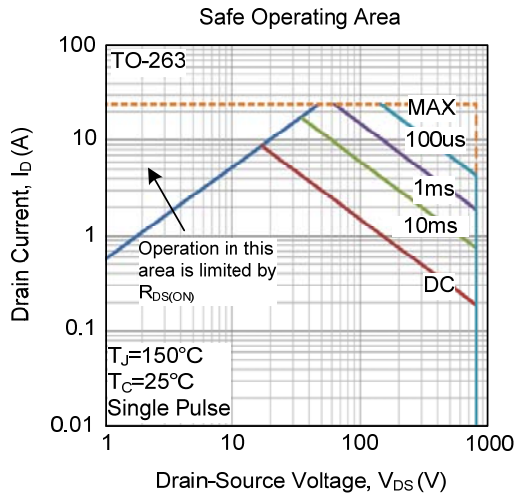
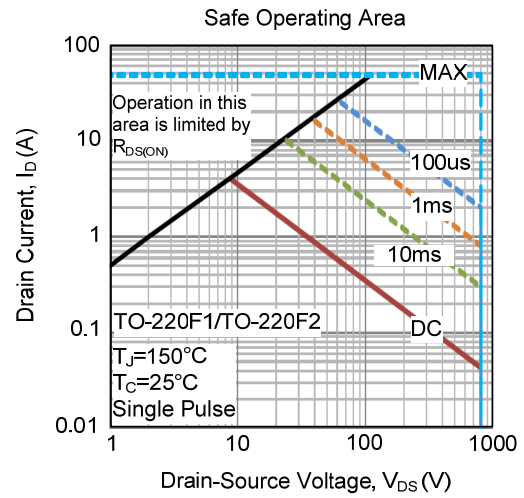
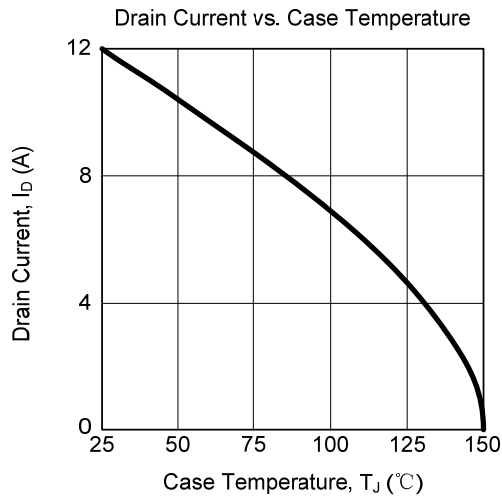
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



TYPICAL CHARACTERISTICS (Cont.)



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