



# 12N80

**Power MOSFET**

## 12A, 800V N-CHANNEL POWER MOSFET

■ DESCRIPTION

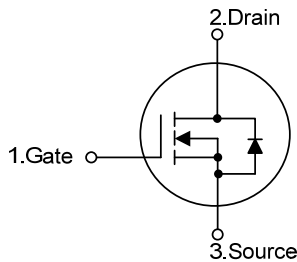
The UTC **12N80** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse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

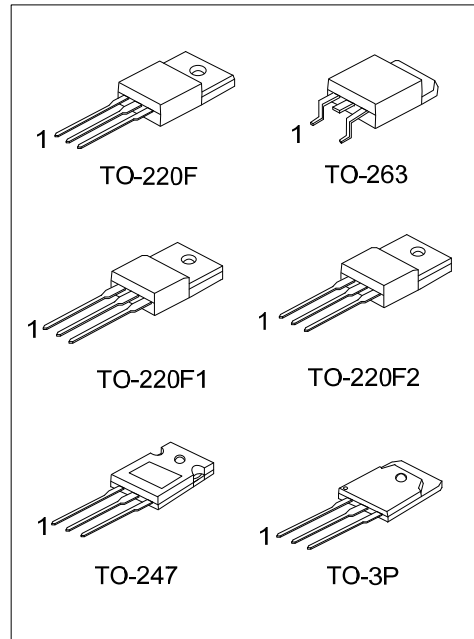


■ ORDERING INFORMATION

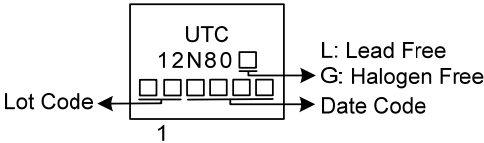
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N80L-TF1-T	12N80G-TF1-T	TO-220F1	G	D	S	Tube
12N80L-TF2-T	12N80G-TF2-T	TO-220F2	G	D	S	Tube
12N80L-TF3-T	12N80G-TF3-T	TO-220F	G	D	S	Tube
12N80L-TQ2-T	12N80G-TQ2-T	TO-263	G	D	S	Tube
12N80L-TQ2-R	12N80G-TQ2-R	TO-263	G	D	S	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-TF1-T</p>	<p>(1) T: Tube, R: Tape Reel                  (2) TF1: TO-220F1, 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		$V_{GSS}$	$\pm 30$	V
Drain Current	Continuous	$I_D$	12	A
	Pulsed (Note 2)	$I_{DM}$	24	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	884	mJ
Power Dissipation	TO-220F/TO-220F1 TO-220F2	$P_D$	48	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 DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F1 TO-220F2	$\theta_{JA}$	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-220F1 TO-220F2	$\theta_{JC}$	2.6	$^\circ\text{C/W}$
	TO-247		0.52	$^\circ\text{C/W}$
	TO-3P		0.48	$^\circ\text{C/W}$
	TO-263		0.75	$^\circ\text{C/W}$

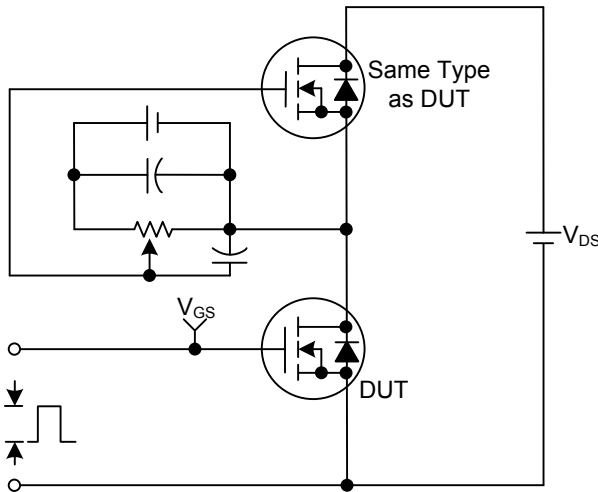
■ ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
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	$\mu\text{A}$
		$V_{DS}=640\text{V}$ , $T_C=125^\circ\text{C}$			100	
Gate- Source Leakage Current	Forward	$I_{GSS}$				
	Reverse					
					-100	nA
<b>ON CHARACTERISTICS</b>						
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	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
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
<b>SWITCHING PARAMETERS</b>						
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
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
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	

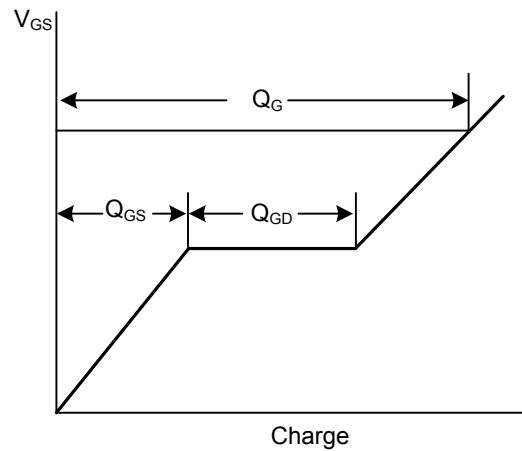
Notes: 1. Pulse Test: Pulse width  $\leq 250\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

2. Essentially independent of operating temperature.

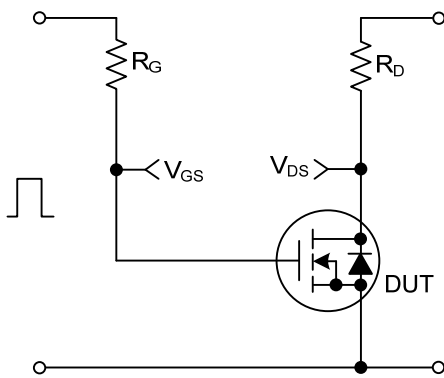
## TEST CIRCUITS AND WAVEFORMS



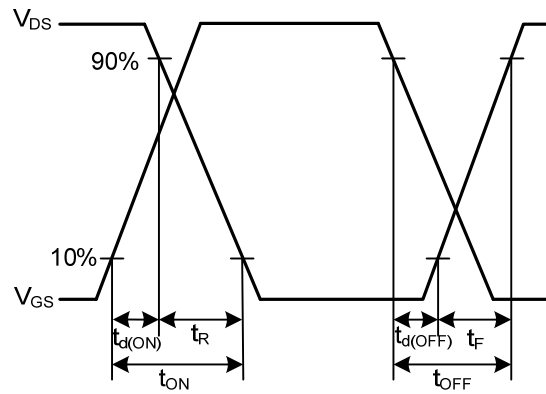
Gate Charge Test Circuit



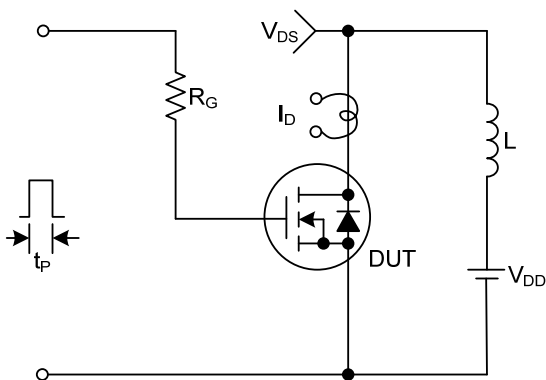
Gate Charge Waveforms



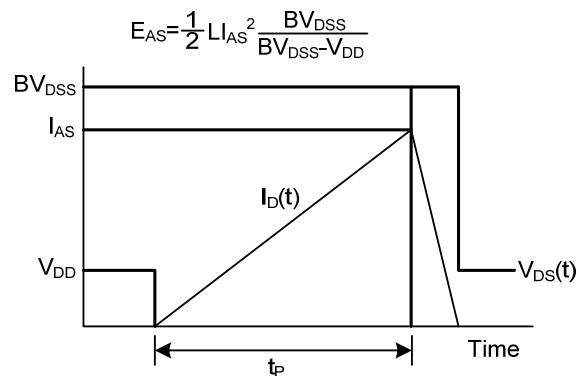
Resistive Switching Test Circuit



Resistive Switching Waveforms

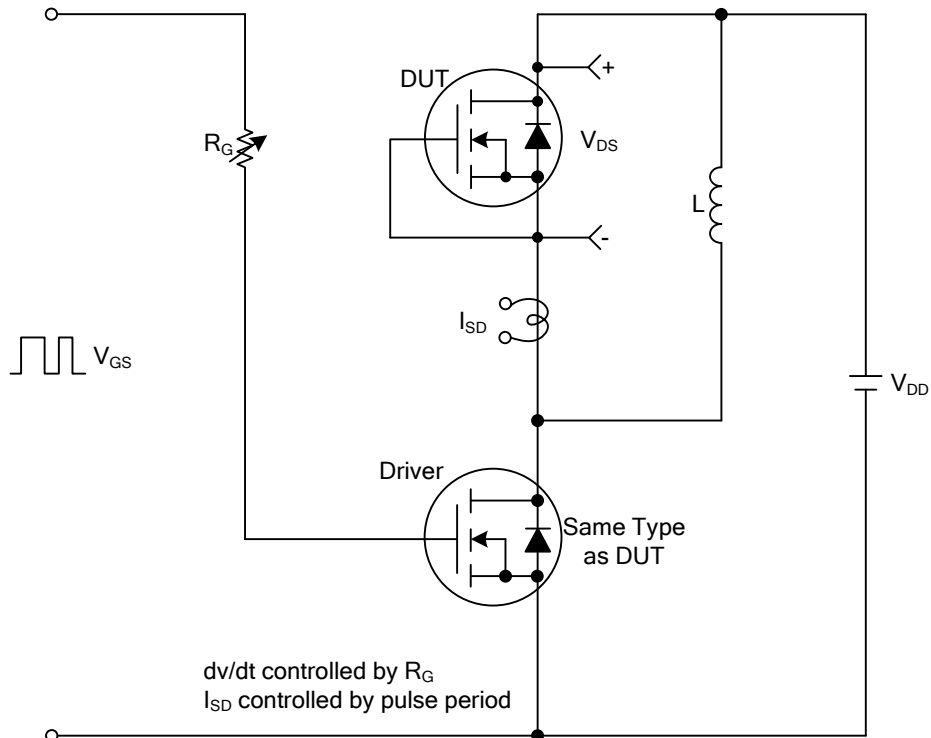


Unclamped Inductive Switching Test Circuit

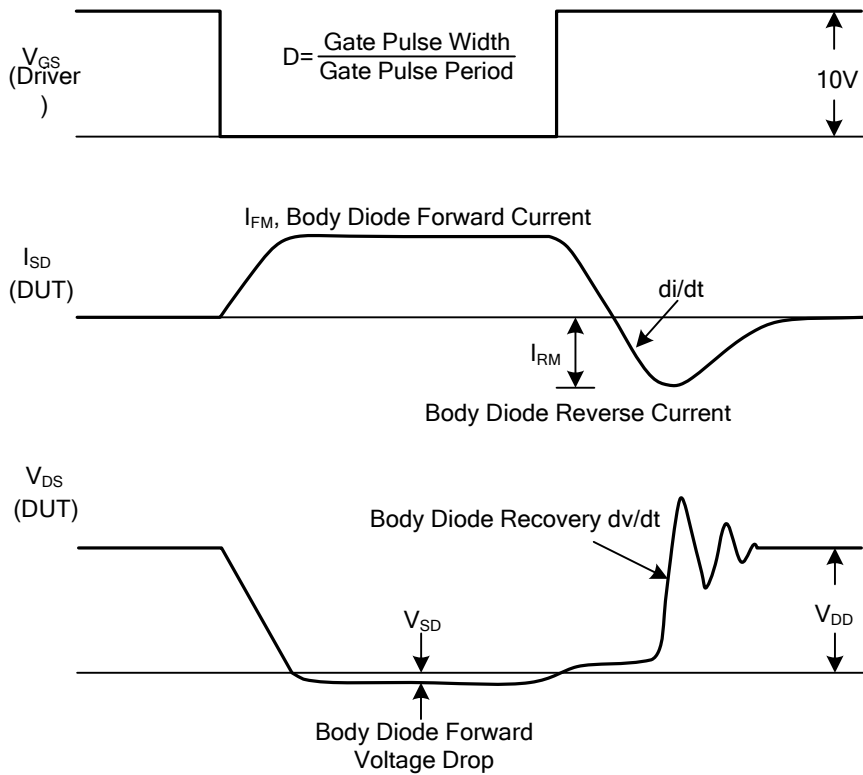


Unclamped Inductive Switching Waveforms

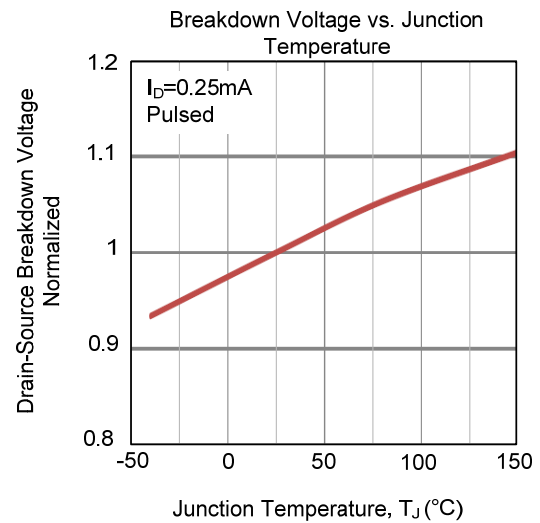
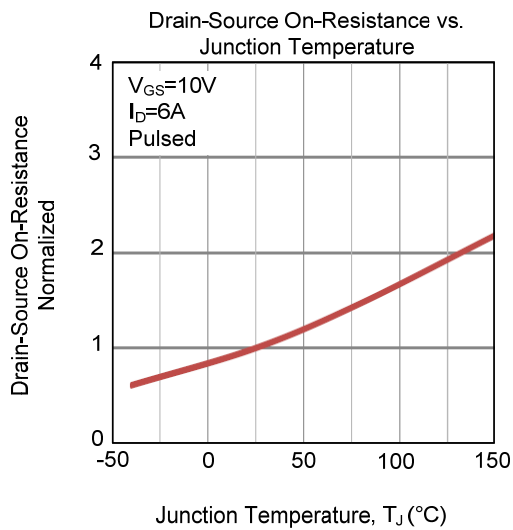
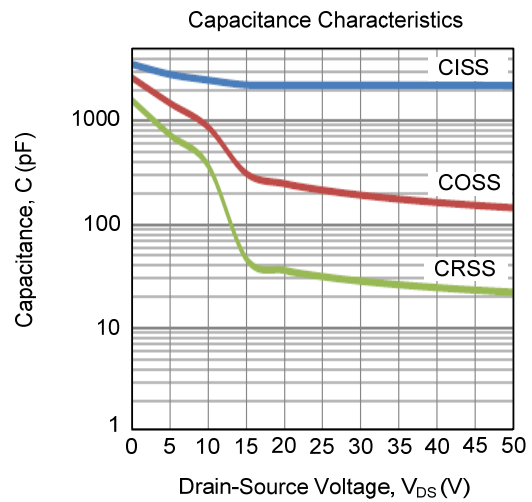
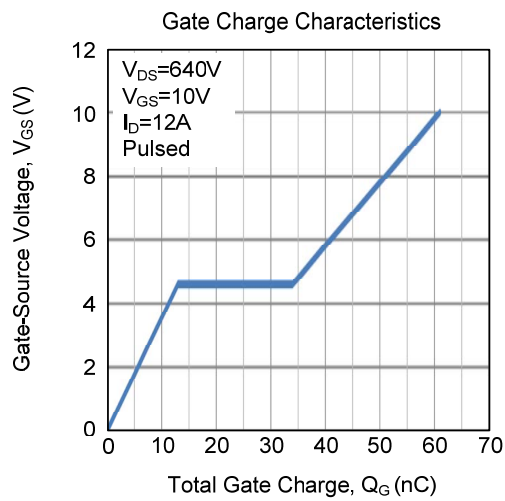
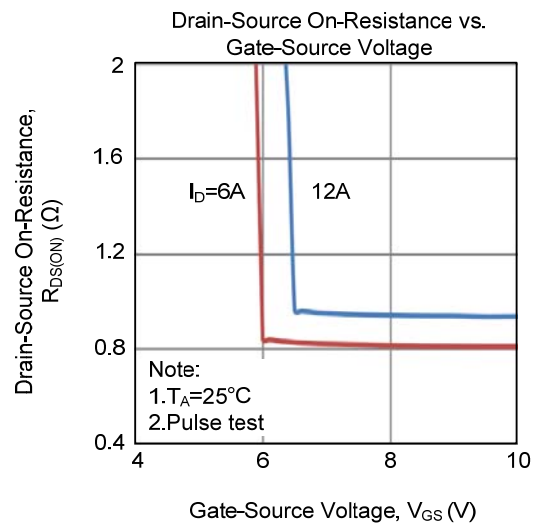
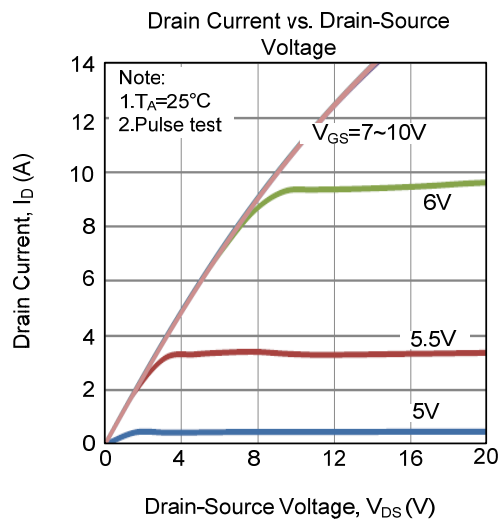
■ TEST CIRCUITS AND WAVEFORMS



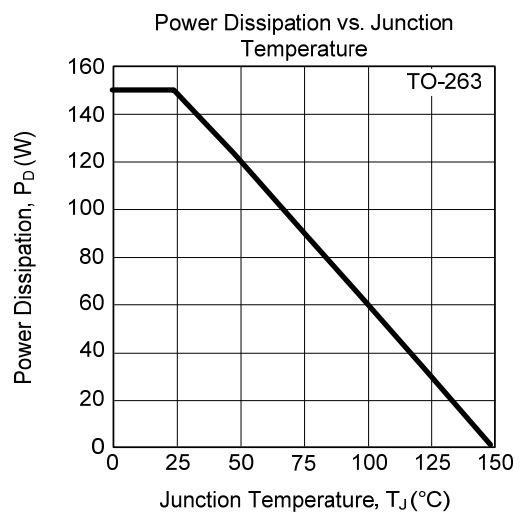
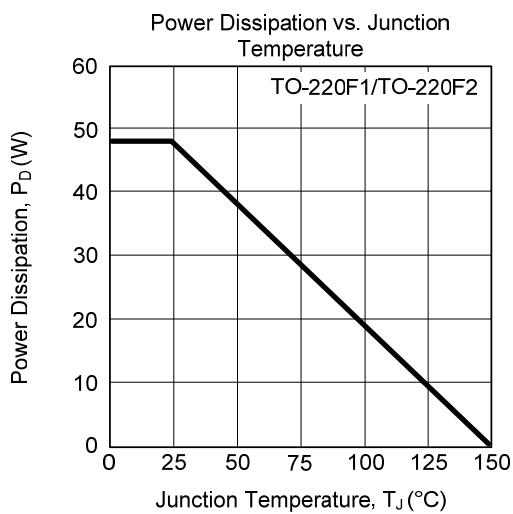
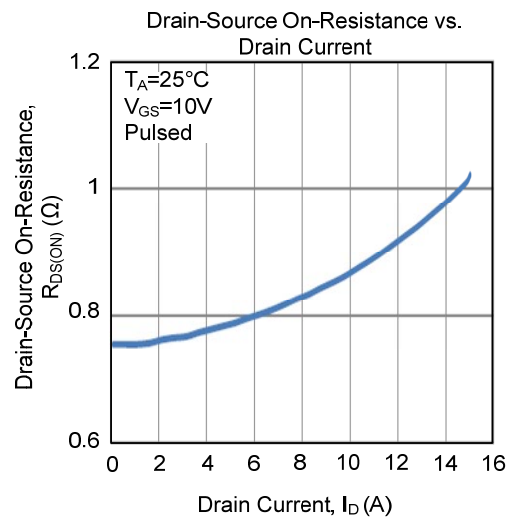
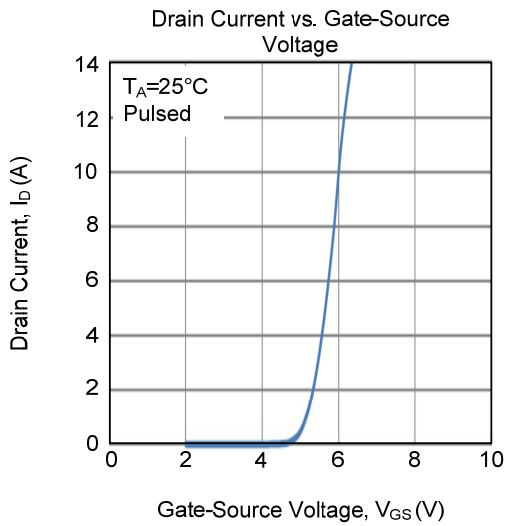
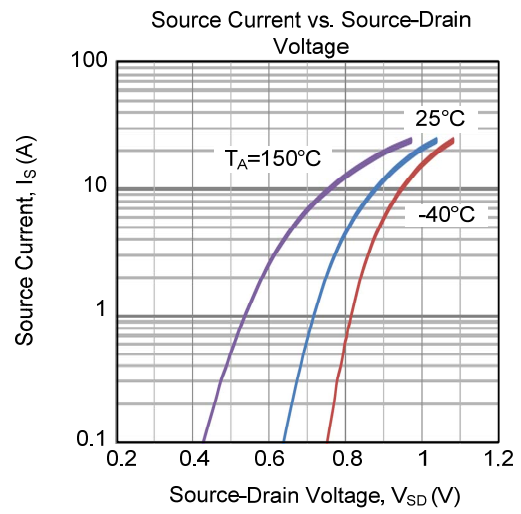
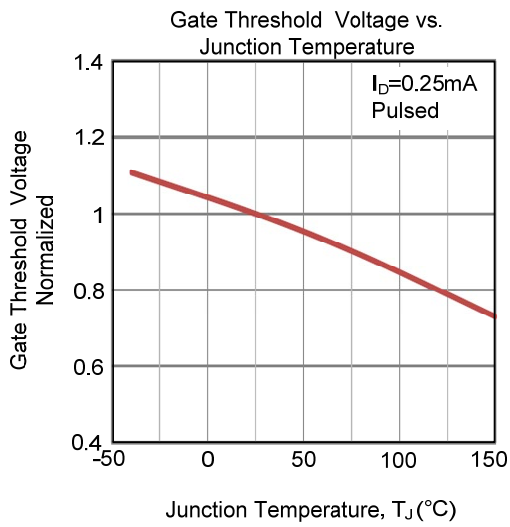
Peak Diode Recovery dv/dt Test Circuit & Waveforms



## TYPICAL CHARACTERISTICS

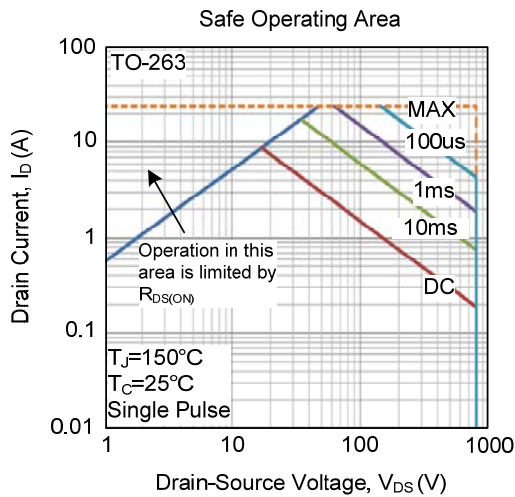
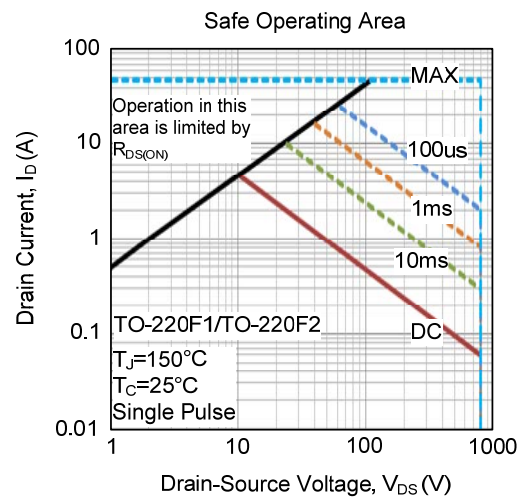
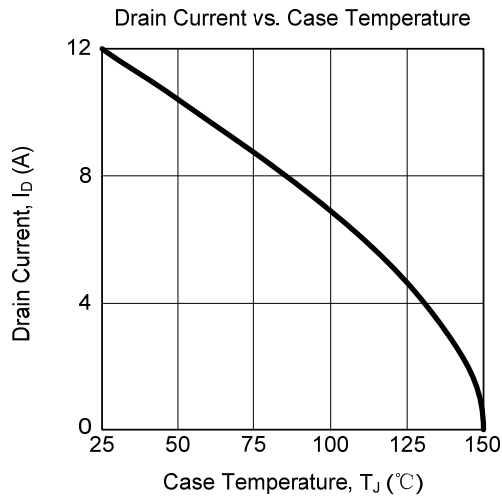


## TYPICAL CHARACTERISTICS (Cont.)





### TYPICAL CHARACTERISTICS (Cont.)



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