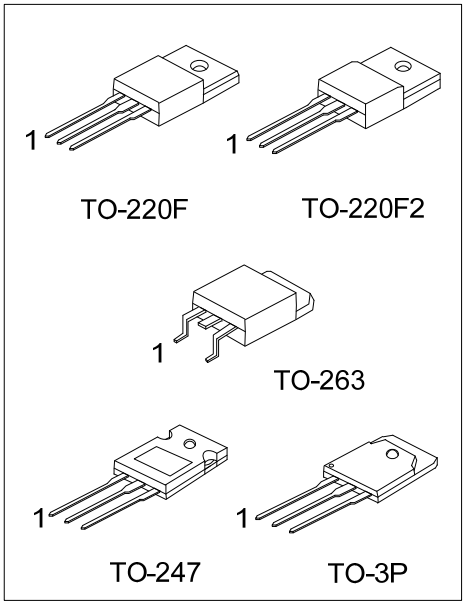
12A, 800V N-CHANNEL POWER MOSFET



■ DESCRIPTION

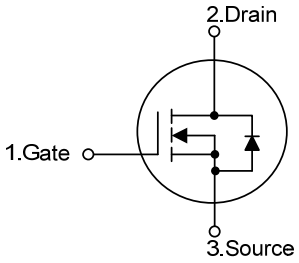
The UTC **12N80** is an N-channel enhancement mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology is specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse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

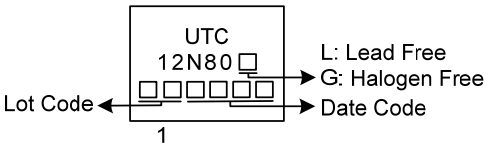
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N80L-TF2-T	12N80G-TF2-T	TO-220F2	G	D	S	Tube
12N80L-TF3-T	12N80G-TF3-T	TO-220F	G	D	S	Tube
12N80L-TQ2-T	12N80G-TQ2-T	TO-263	G	D	S	Tube
12N80L-TQ2-R	12N80G-TQ2-R	TO-263	G	D	S	Tape Reel
12N80L-T47-T	12N80G-T47-T	TO-247	G	D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

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

12N80G-TF2-T
(1) Packing Type
(2) Package Type
(3) Green Package

(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

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°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	Single Pulsed (Note 3)	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	°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=10mH, I_{AS}=13.3A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C

■ THERMAL CHARACTERISTICS

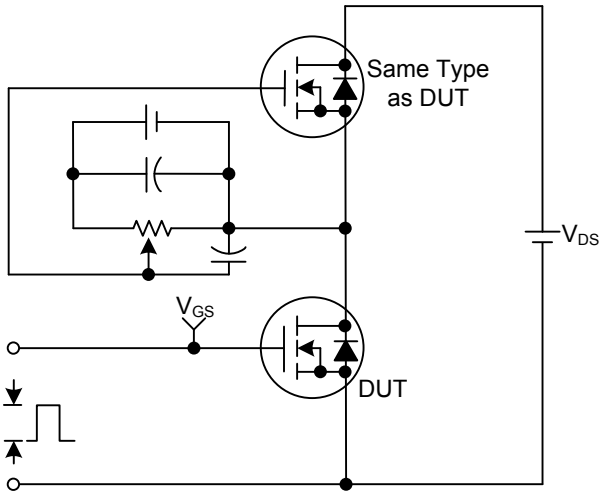
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F2	θ_{JA}	62.5	°C/W
	TO-247		50	°C/W
	TO-3P		40	°C/W
	TO-263		62.5	°C/W
Junction to Case	TO-220F/TO-220F2	θ_{JC}	3.6	°C/W
	TO-247		0.52	°C/W
	TO-3P		0.48	°C/W
	TO-263		0.75	°C/W

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

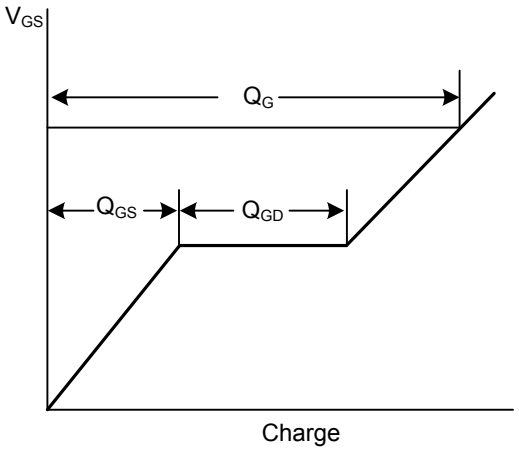
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	800			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=800V, V_{GS}=0V			10	μA
			V_{DS}=640V, T_C=125°C			100	
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, 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	3.0		5.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=6.0A			1.0	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		2200		pF
Output Capacitance		C_{OSS}			200		pF
Reverse Transfer Capacitance		C_{RSS}			30		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=400V, V_{GS}=10V, I_D=12A I_G=1mA (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}=100V, V_{GS}=10V, I_D=12A, R_G=25Ω (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=12A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_S=12A, dI_F/dt=100A/μs (Note 1)		630		ns
Body Diode Reverse Recovery Charge		Q_{rr}			12		μC

Notes: 1. Pulse Test: Pulse width ≤ 250μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

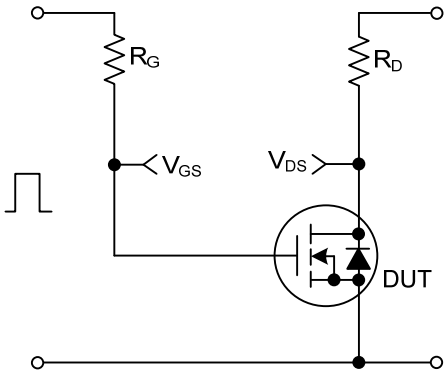
■ TEST CIRCUITS AND WAVEFORMS



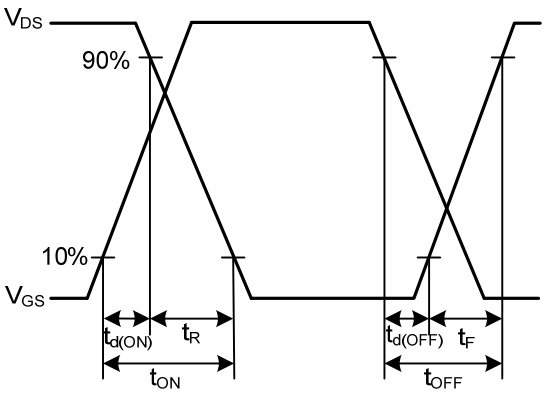
Gate Charge Test Circuit



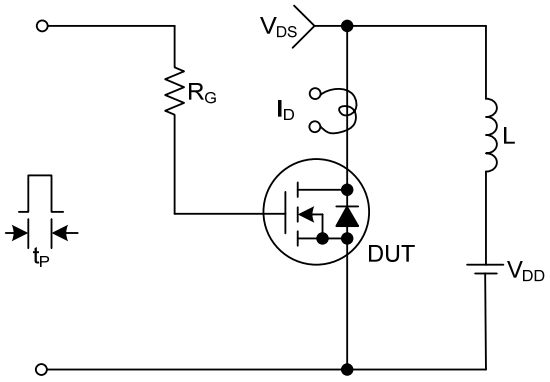
Gate Charge Waveforms



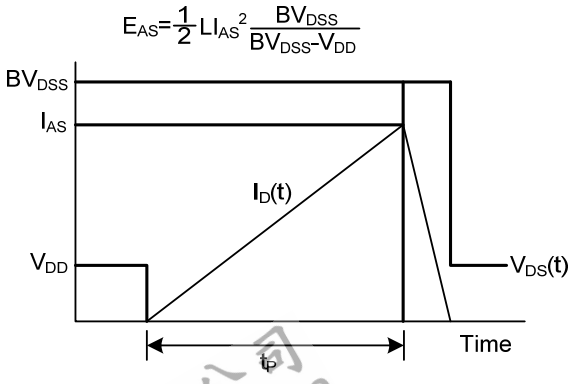
Resistive Switching Test Circuit



Resistive Switching Waveforms

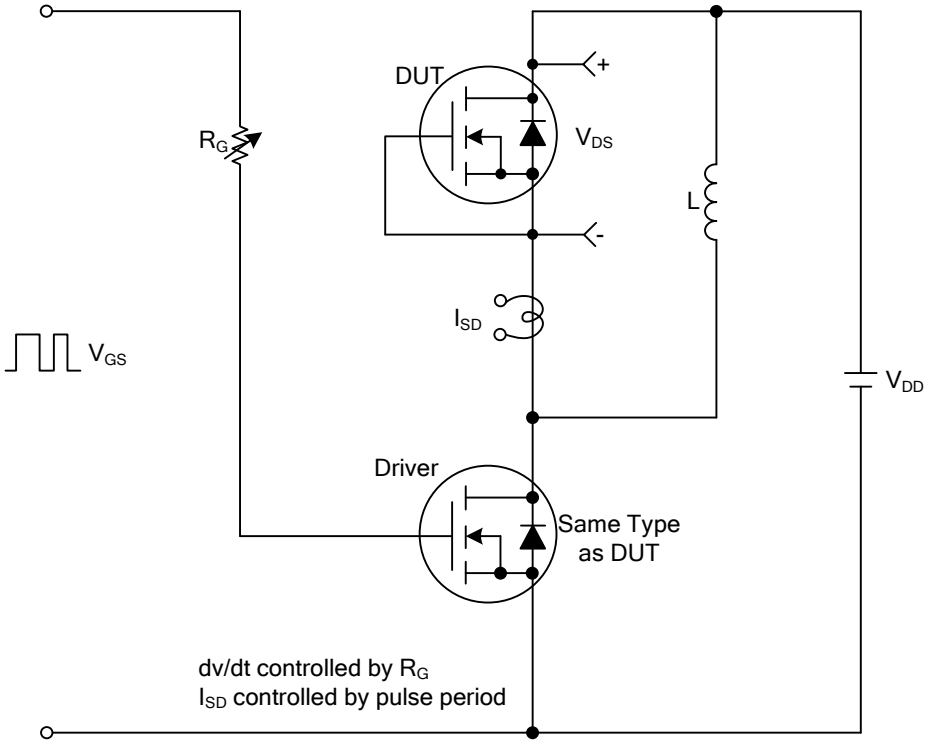


Unclamped Inductive Switching Test Circuit

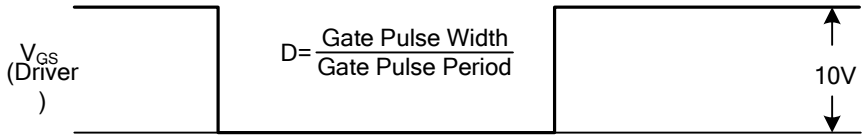


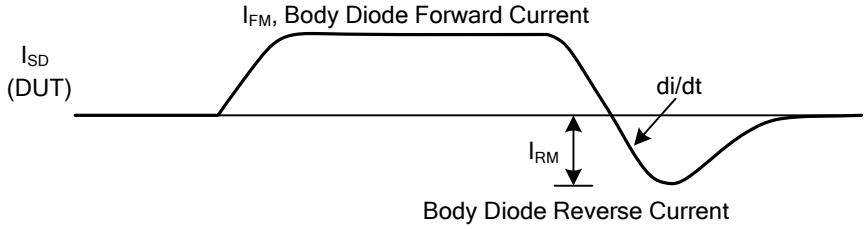
Unclamped Inductive Switching Waveforms

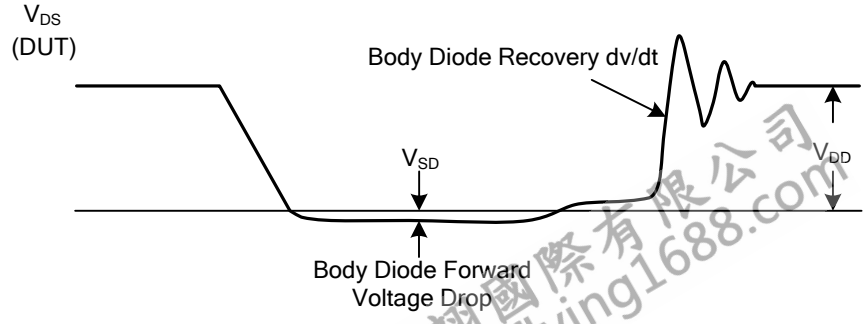
■ TEST CIRCUITS AND WAVEFORMS



Peak Diode Recovery dv/dt Test Circuit & Waveforms

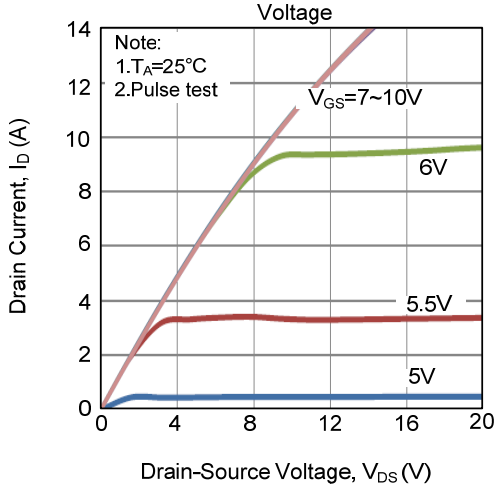




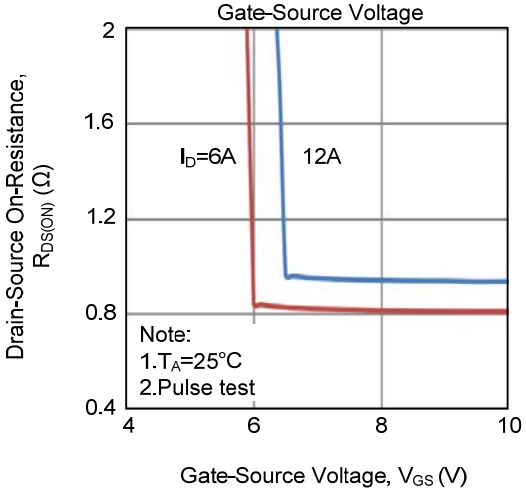


■ TYPICAL CHARACTERISTICS

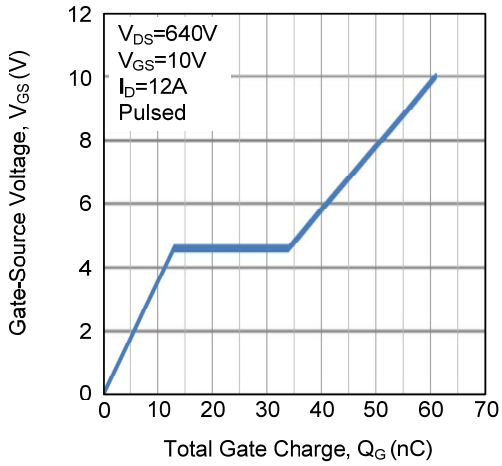
Drain Current vs. Drain-Source Voltage



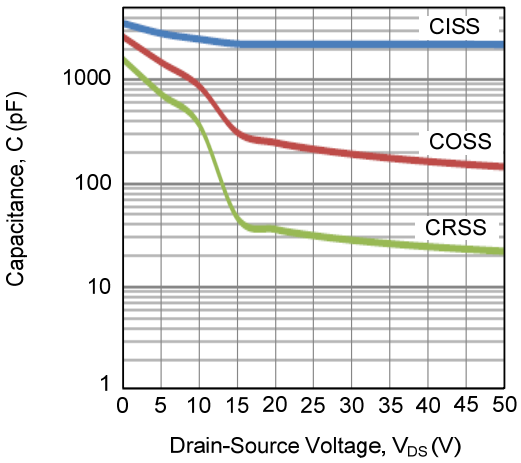
Drain-Source On-Resistance vs. Gate-Source Voltage



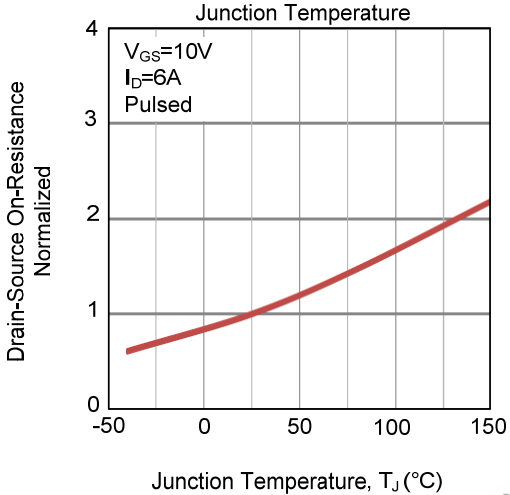
Gate Charge Characteristics



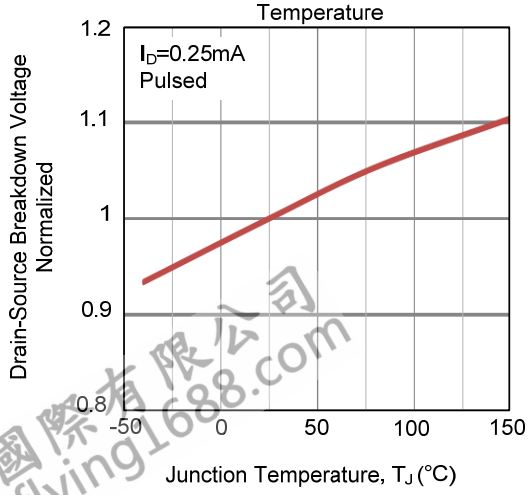
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

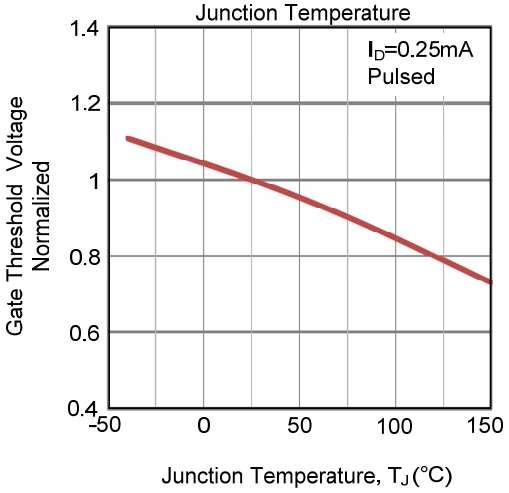


Breakdown Voltage vs. Junction Temperature

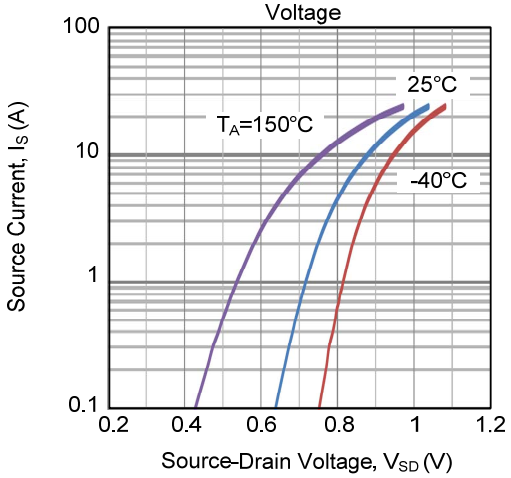


■ TYPICAL CHARACTERISTICS (Cont.)

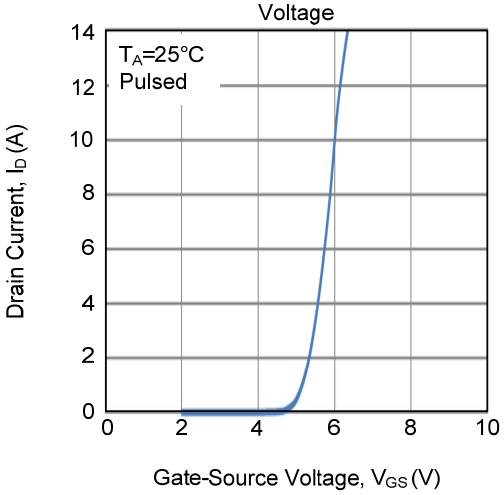
Gate Threshold Voltage vs. Junction Temperature



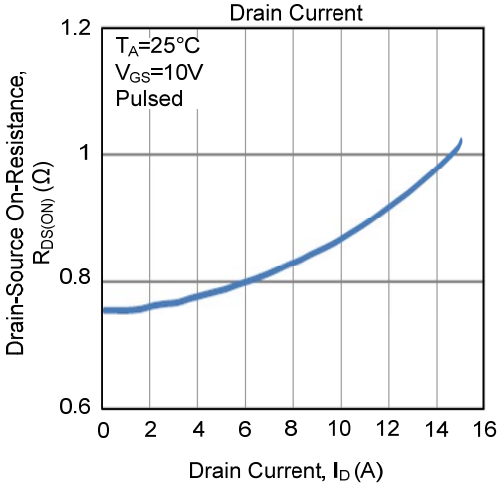
Source Current vs. Source-Drain Voltage



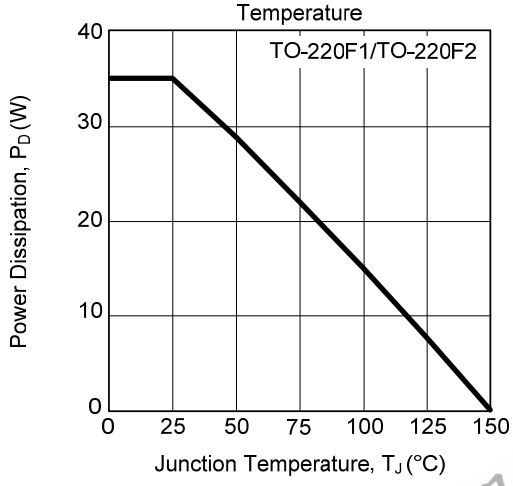
Drain Current vs. Gate-Source Voltage



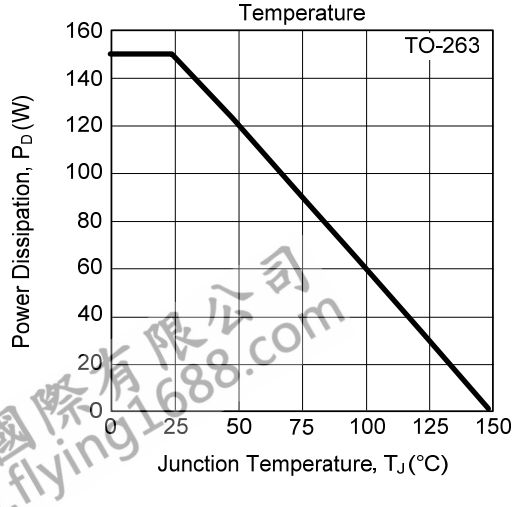
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Power Dissipation vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)