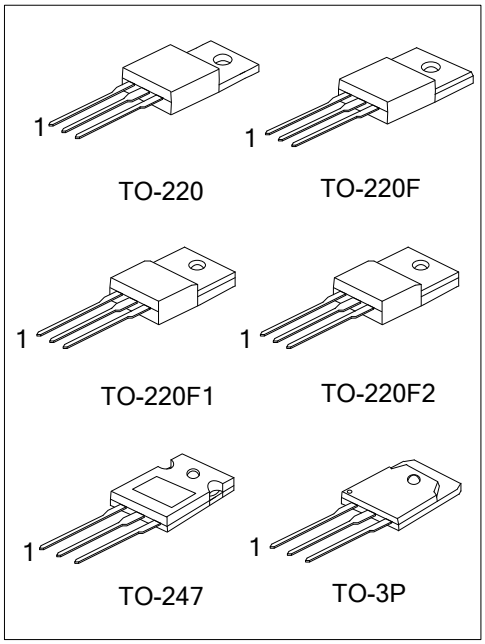
12NM90

Power MOSFET

12A, 900V N-CHANNEL SUPER-JUNCTION MOSFET



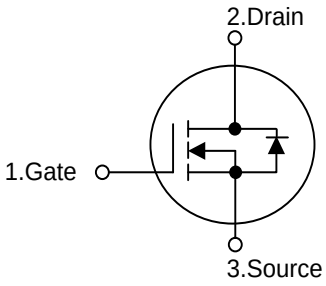
■ DESCRIPTION

The **UTC 12NM90** 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

* $R_{DS(ON)} \leq 0.7\ \Omega$ @ V_{GS}=10V, I_D=6.0A
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12NM90L-TA3-T	12NM90G-TA3-T	TO-220	G	D	S	Tube
12NM90L-TF1-T	12NM90G-TF1-T	TO-220F1	G	D	S	Tube
12NM90L-TF2-T	12NM90G-TF2-T	TO-220F2	G	D	S	Tube
12NM90L-TF3-T	12NM90G-TF3-T	TO-220F	G	D	S	Tube
12NM90L-T47-T	12NM90G-T47-T	TO-247	G	D	S	Tube
12NM90L-T3P-T	12NM90G-T3P-T	TO-3P	G	D	S	Tube

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

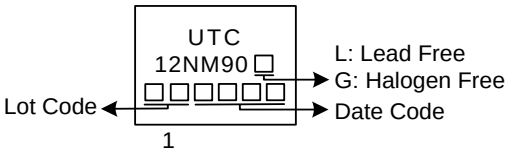
12NM90G-TA3-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2
TF3: TO-220F, T3P: TO-3P, T47: TO-247
(3) G: Halogen Free and Lead Free, L: Lead Free

FLYING 汇翔国际有限公司 www.flying1688.com

Copyright © 2020 Unisonic Technologies Co., Ltd

■ MARKING



FLYING 汎翊國際有限公司 www.flying1688.com

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	900	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current	Continuous	I_D	12	A
Pulsed Drain Current	Pulsed (Note 2)	I_{DM}	24	A
Single Pulsed Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	156	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2	V/ns
Power Dissipation	TO-220	P_D	90	W
	TO-220F/TO-220F1 TO-220F2		31	W
	TO-3P		190	W
	TO-247		180	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} =5.6A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD} ≤ 12A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2	θ_{JA}	62.5	°C/W
	TO-3P		30	°C/W
	TO-247		40	°C/W
Junction to Case	TO-220	θ_{JC}	1.39	°C/W
	TO-220F/TO-220F1 TO-220F2		4.03	°C/W
	TO-3P		0.66	°C/W
	TO-247		0.69	°C/W

汎翊國際有限公司 www.flying1688.com FLYING

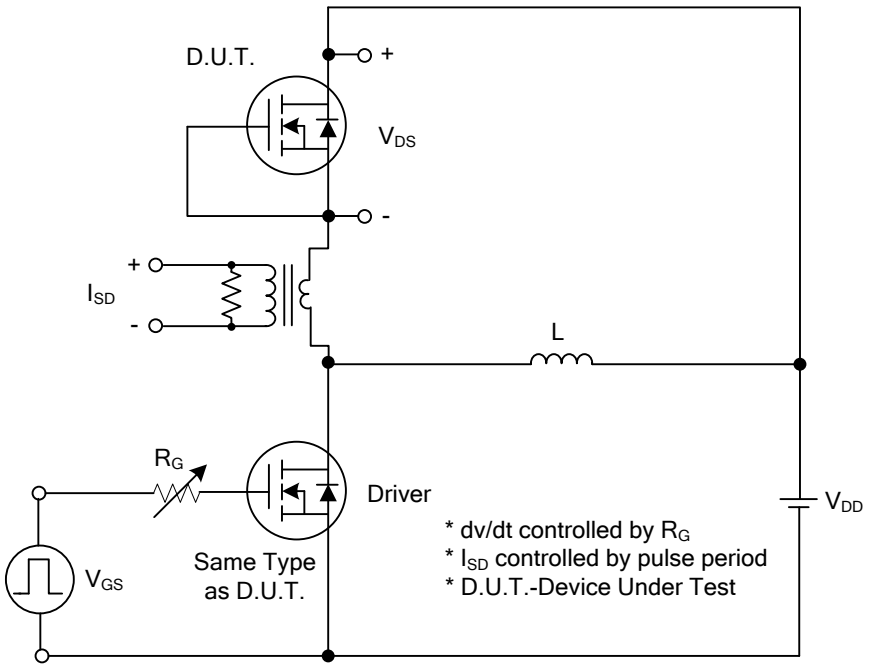
■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	900			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=900V, 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=6.0A			0.7	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1230		pF
Output Capacitance		C_{OSS}			820		pF
Reverse Transfer Capacitance		C_{RSS}			30		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=720V, I_D=12A, I_G=1mA V_{GS}=10V (Note 1,2)		50		nC
Gate to Source Charge		Q_{GS}			8		nC
Gate to Drain Charge		Q_{GD}			16		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=100V, I_D=12A, R_G =25Ω, V_{GS}=10V (Note 1,2)		22		nS
Rise Time		t_R			23		nS
Turn-OFF Delay Time		$t_{D(OFF)}$			150		nS
Fall-Time		t_F			50		nS
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				12	A
Maximum Body-Diode Pulsed Current		I_{SM}				24	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=12A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	I_S=12A, V_{GS}=0V, dI_F/dt=100A/μs		595		nS
Body Diode Reverse Recovery Charge		Q_{rr}			10.4		μC

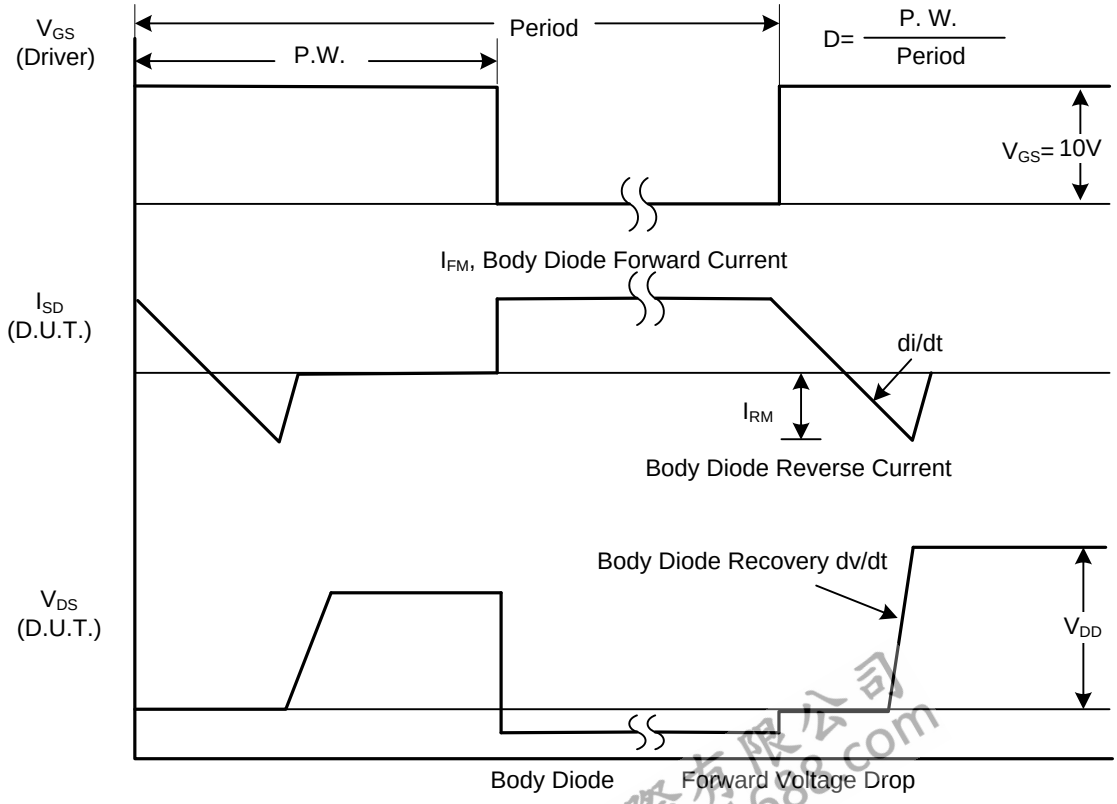
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating ambient temperature.

汎翊國際有限公司 www.flying1688.com FLYING

■ TEST CIRCUITS AND WAVEFORMS



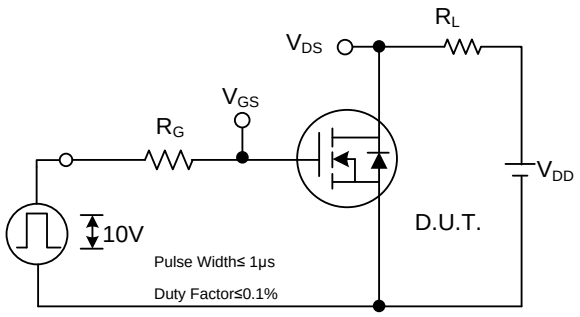
Peak Diode Recovery dv/dt Test Circuit



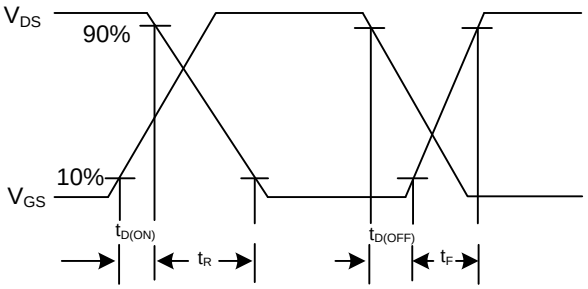
Peak Diode Recovery dv/dt Waveforms

FLYING 汎翊國際有限公司 www.flying1688.com

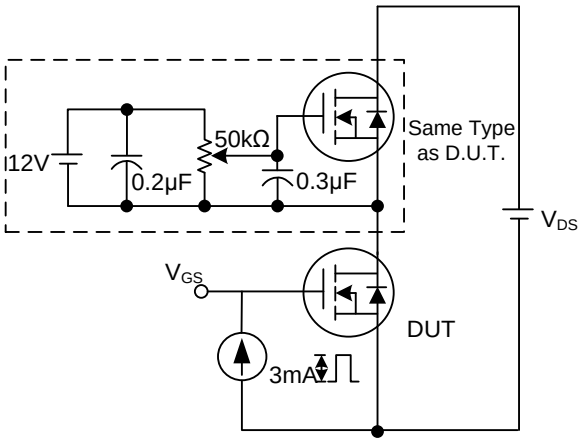
■ TEST CIRCUITS AND WAVEFORMS



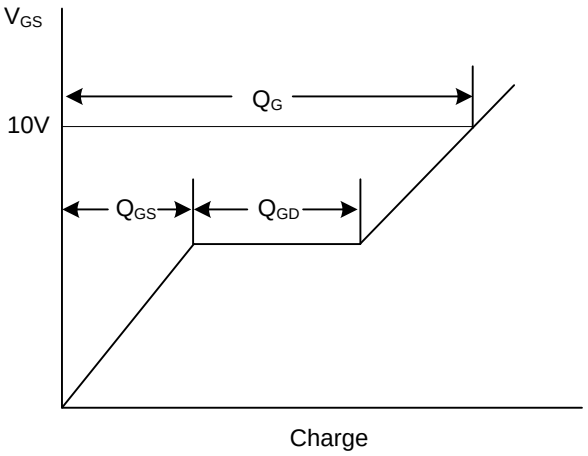
Switching Test Circuit



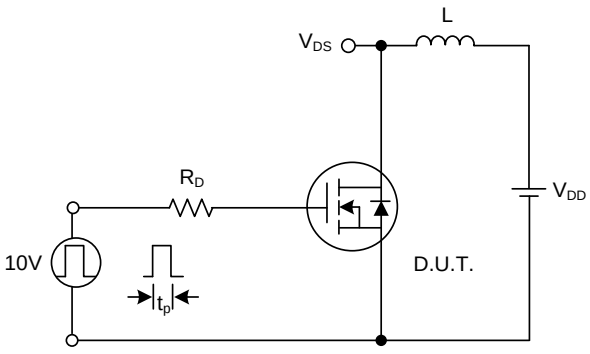
Switching Waveforms



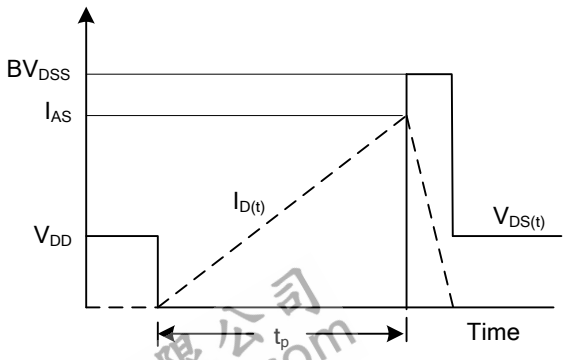
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit

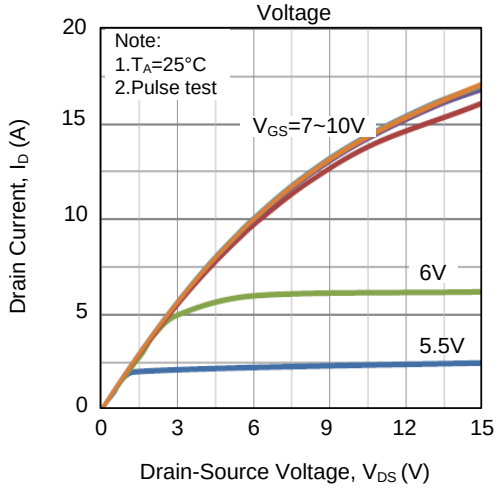


Unclamped Inductive Switching Waveforms

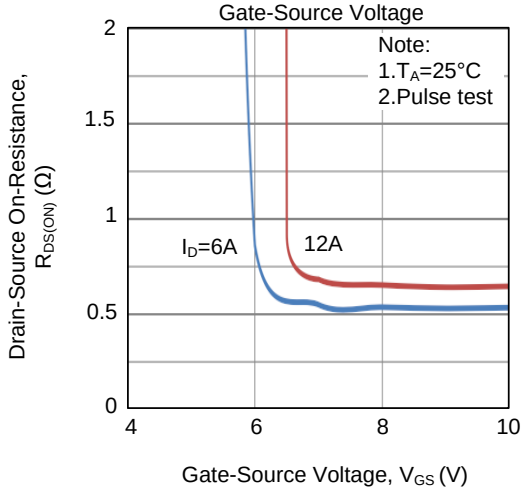
FLYING 汎翊國際有限公司 www.flying1688.com

■ TYPICAL CHARACTERISTICS

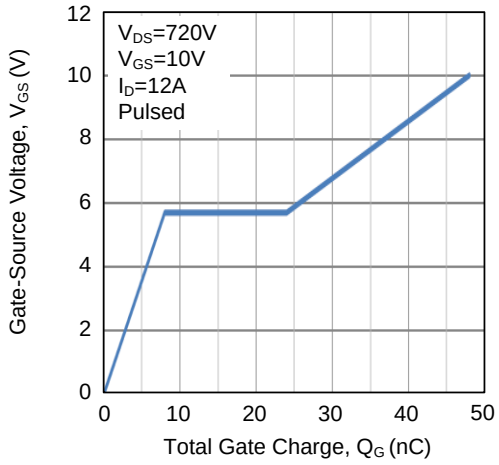
Drain Current vs. Drain-Source Voltage



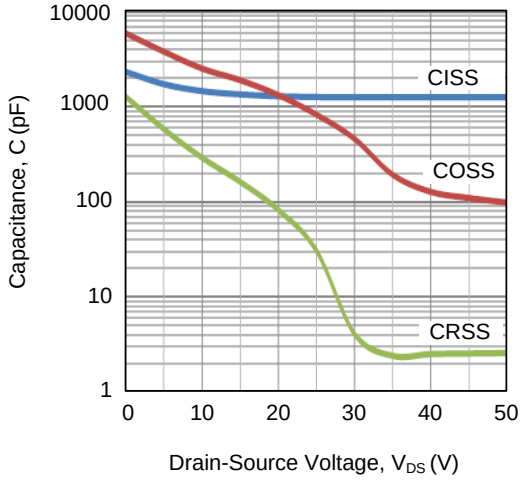
Drain-Source On-Resistance vs. Gate-Source Voltage



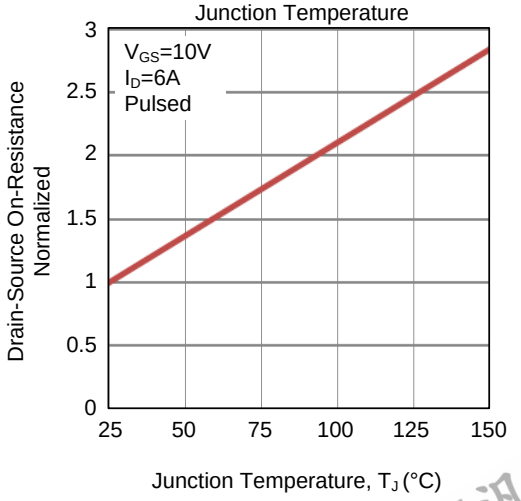
Gate Charge Characteristics



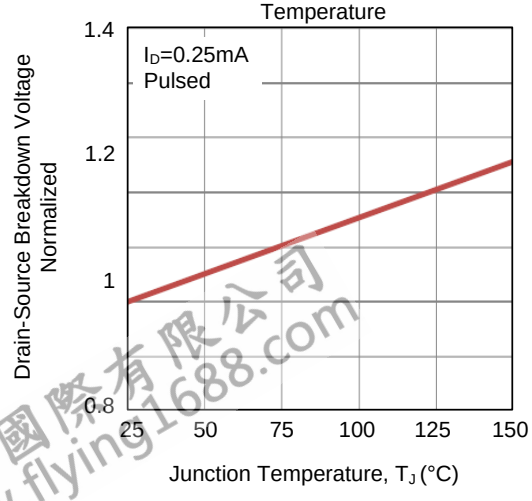
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature



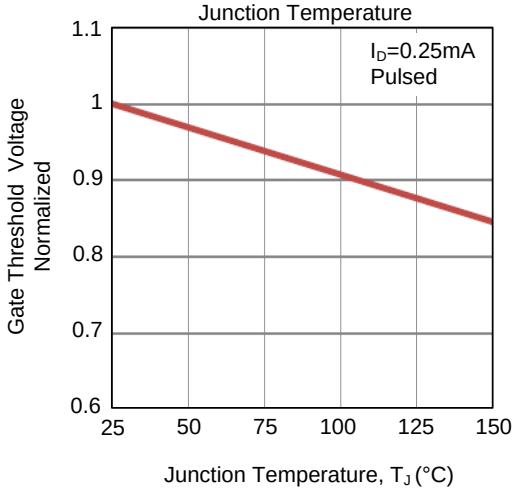
Breakdown Voltage vs. Junction Temperature



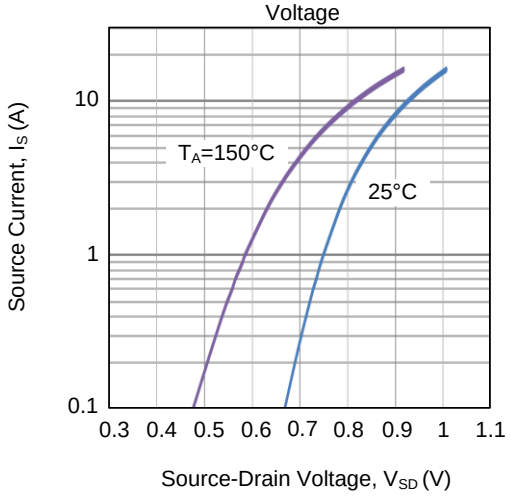
FLYING 汎翊國際有限公司 www.flying1688.com

■ TYPICAL CHARACTERISTICS (Cont.)

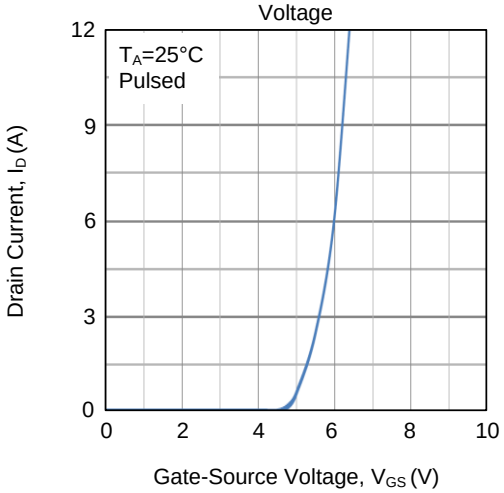
Gate Threshold Voltage vs. Junction Temperature



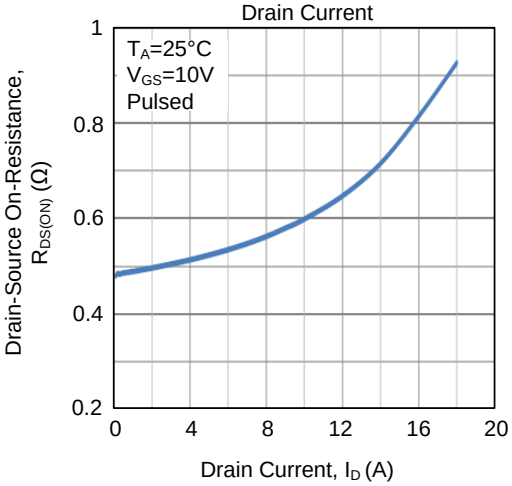
Source Current vs. Source-Drain Voltage



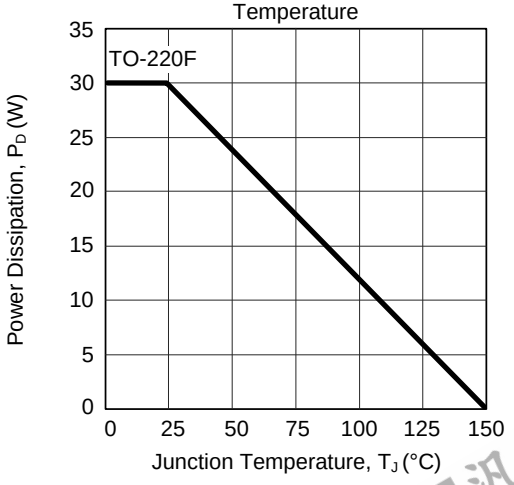
Drain Current vs. Gate-Source Voltage



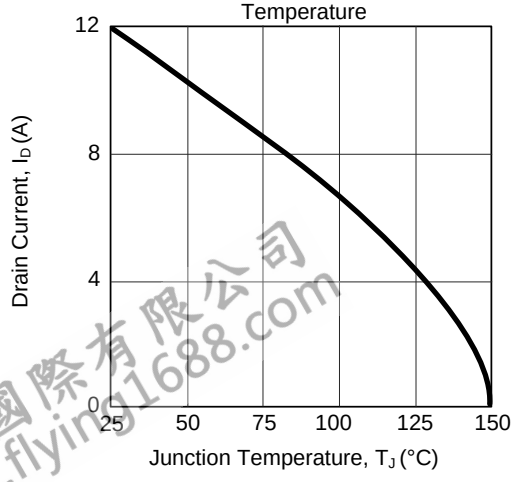
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature

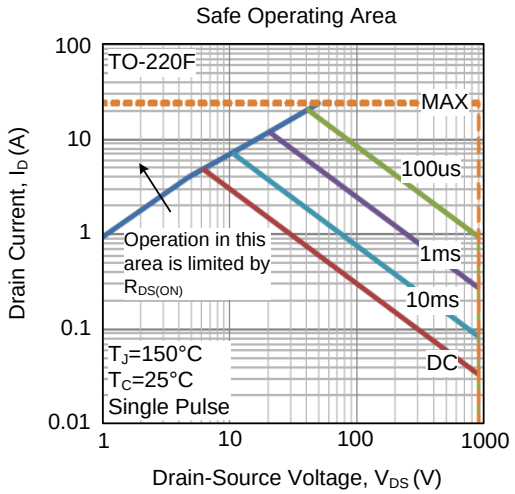


Drain Current vs. Junction Temperature



FLYING 汎翊國際有限公司 www.flying1688.com

■ TYPICAL CHARACTERISTICS (Cont.)



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.