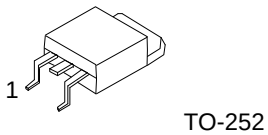
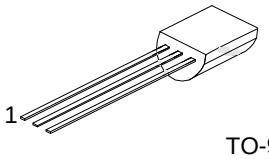
2N50Q-TA

Power MOSFET

2A, 500V N-CHANNEL POWER MOSFET



TO-252



TO-92

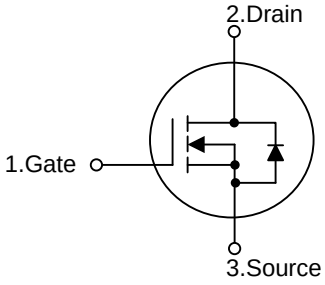
■ DESCRIPTION

The UTC **2N50Q-TA** is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

■ FEATURES

* $R_{DS(ON)} \leq 5.5\Omega$ @ V_{GS}=10V, I_D=1.0A
* High Switching Speed
* 100% Avalanche Tested

■ SYMBOL



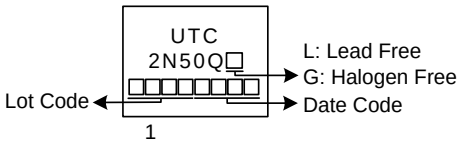
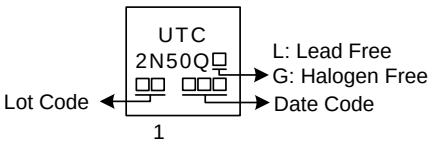
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
2N50QL-TN3-R	2N50QG-TN3-R	TO-252	G	D	S	Tape Reel
2N50QL-T92-B	2N50QG-T92-B	TO-92	G	D	S	Tape Box
2N50QL-T92-K	2N50QG-T92-K	TO-92	G	D	S	Bulk

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

2N50QG-TN3-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel, B: Tape Box, K: Bulk (2) TN3: TO-252, T92: TO-92 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-252	TO-92
	

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	2	A
	Pulsed (Note 2)	I_{DM}	4	A
Avalanche Current (Note 2)		I_{AR}	1.4	A
Avalanche Energy (Note 3)	Single Pulsed	E_{AS}	40	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.4	V/ns
Power Dissipation	TO-252	P_D	30	W
	TO-92		1.42	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=41mH, I_{AS}=1.4A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD}≤2.0A, di/dt≤200A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252	θ_{JA}	110	°C/W
	TO-92		60	°C/W
Junction to Case	TO-252	θ_{JC}	4.17 (Note)	°C/W
	TO-92		88	°C/W

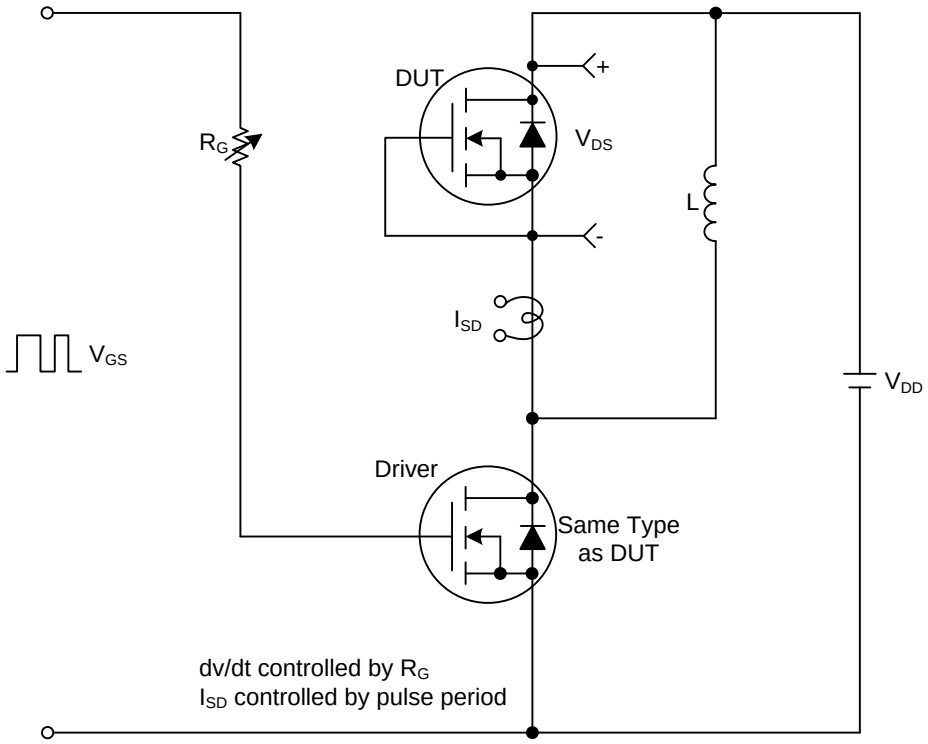
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

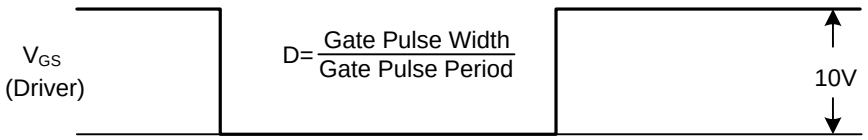
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=1.0A			5.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		140		pF
Output Capacitance		C_{OSS}			22		pF
Reverse Transfer Capacitance		C_{RSS}			3		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{DS}=400V, V_{GS}=10V, I_D=2A, I_G=1mA (Note 1, 2)		4.9		nC
Gate to Source Charge		Q_{GS}			2.3		nC
Gate to Drain Charge		Q_{GD}			0.8		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD} =100V, V_{GS}=1.0V, I_D =2A, R_G=25Ω (Note 1, 2)		4		ns
Rise Time		t_R			15		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			12		ns
Fall-Time		t_F			24		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				2	A
Maximum Body-Diode Pulsed Current		I_{SM}				4	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=2.0A, V_{GS}=0V			1.2	V
Reverse Recovery Time		t_{RR}	V_{GS}=0V, I_{SD}=2.0A, di/dt=100A/μs		280		ns
Reverse Recovery Charge		Q_{RR}			0.58		μC

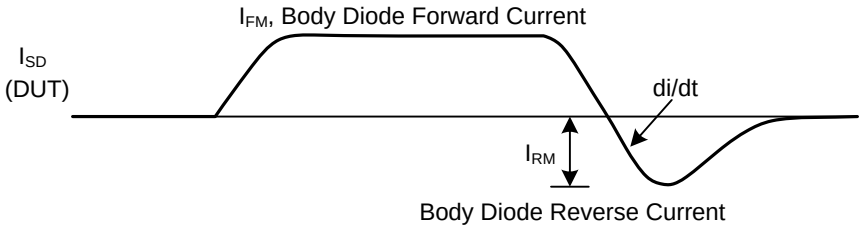
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

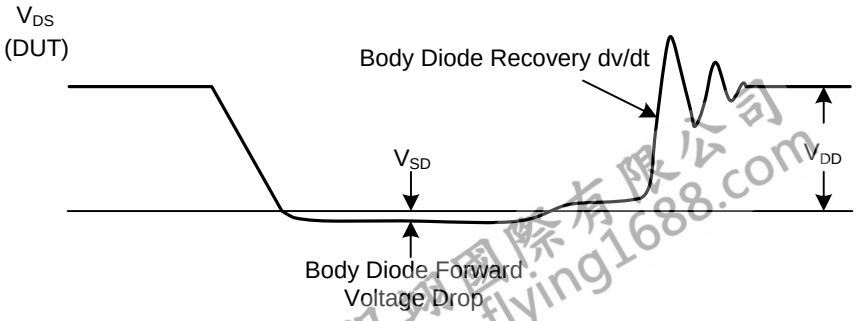
■ TEST CIRCUITS AND WAVEFORMS



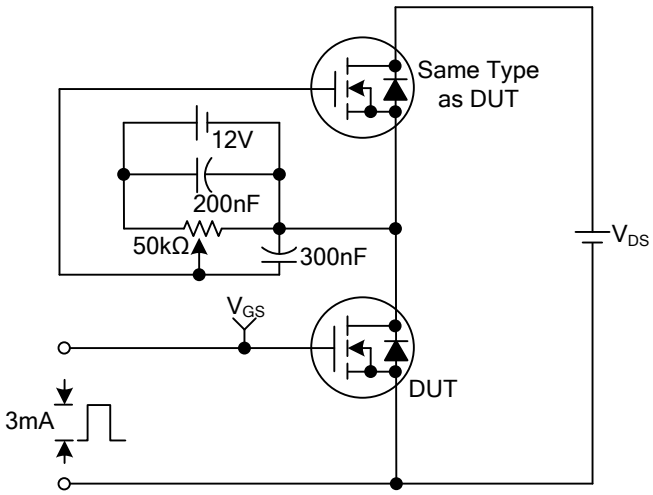
Peak Diode Recovery dv/dt Test Circuit & Waveforms



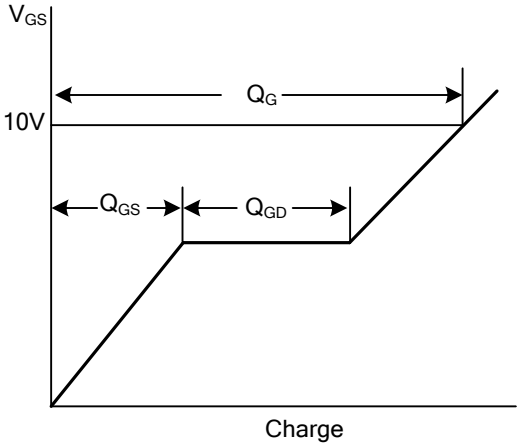




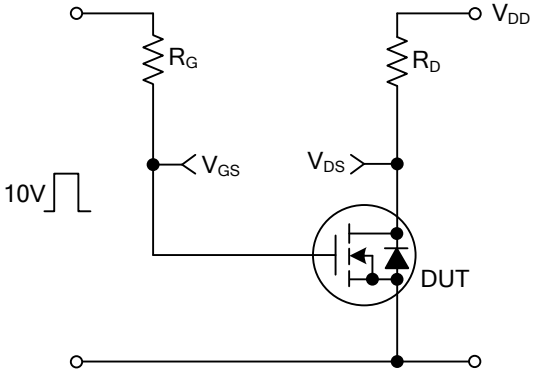
■ TEST CIRCUITS AND WAVEFORMS



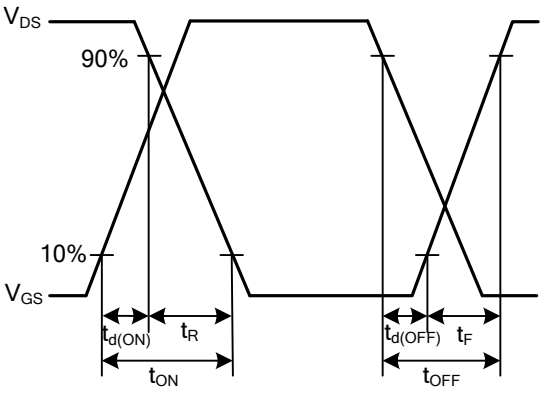
Gate Charge Test Circuit



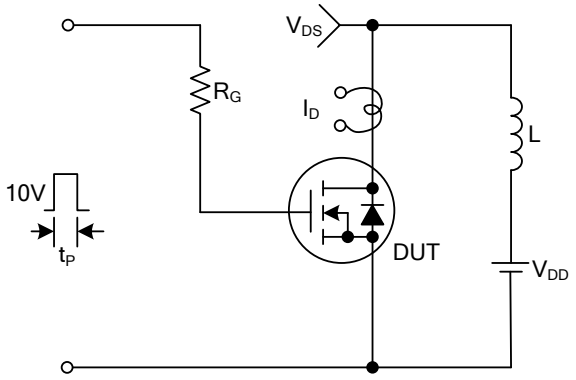
Gate Charge Waveforms



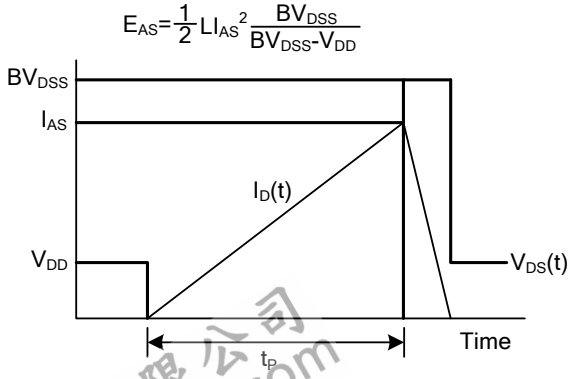
Resistive Switching Test Circuit



Resistive Switching Waveforms



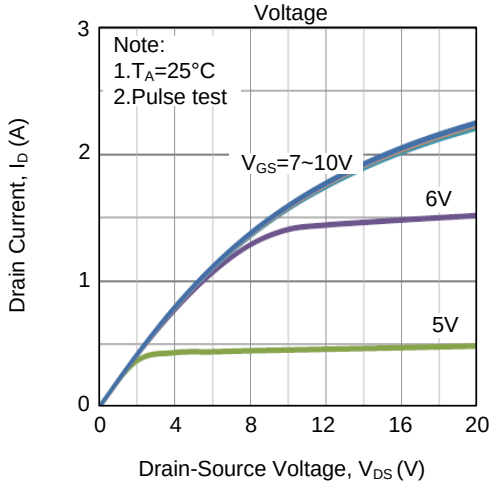
Unclamped Inductive Switching Test Circuit



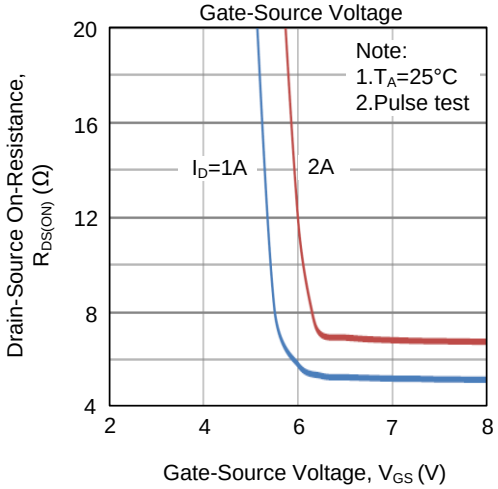
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

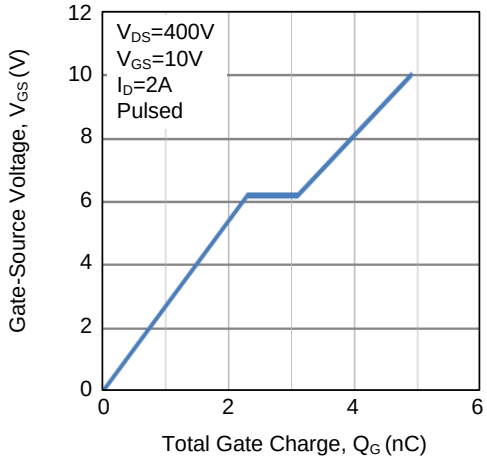
Drain Current vs. Drain-Source Voltage



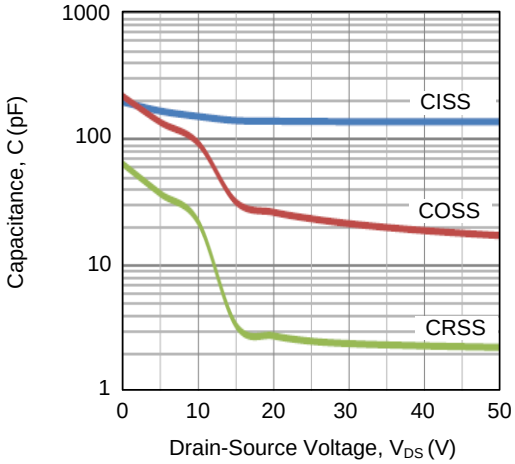
Drain-Source On-Resistance vs. Gate-Source Voltage



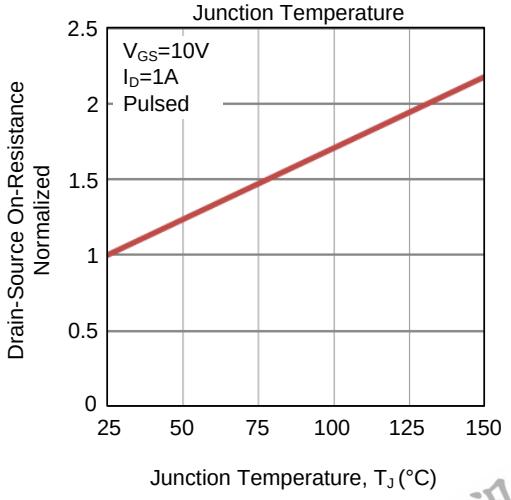
Gate Charge Characteristics



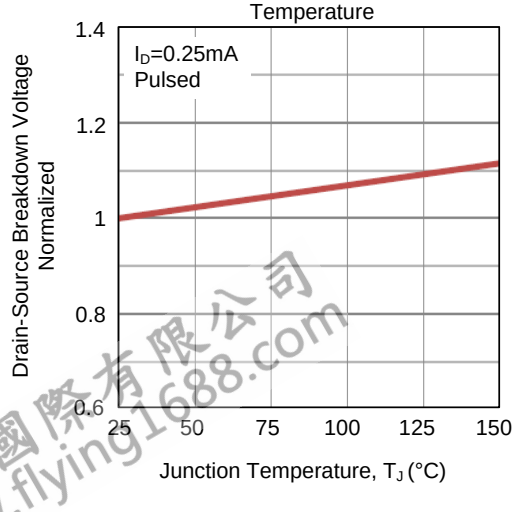
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

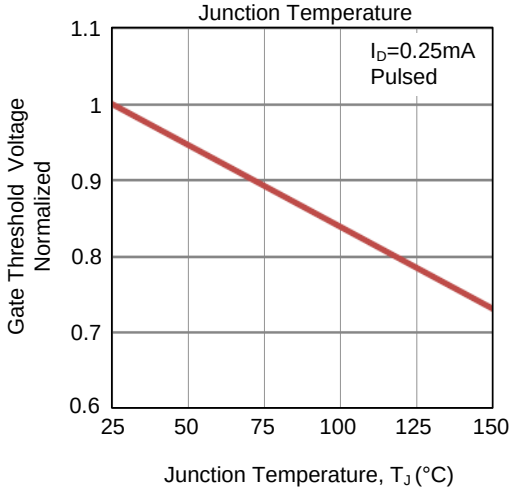


Breakdown Voltage vs. Junction Temperature

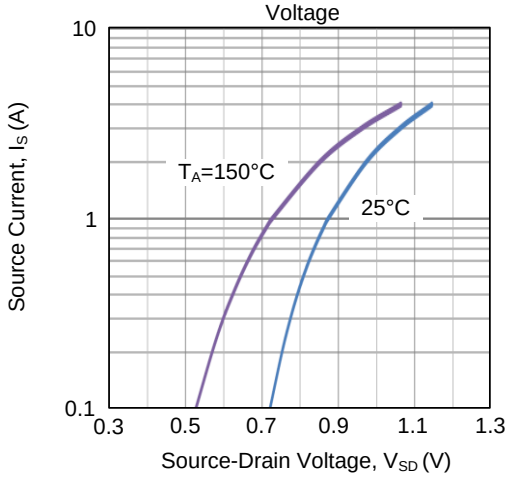


■ TYPICAL CHARACTERISTICS (Cont.)

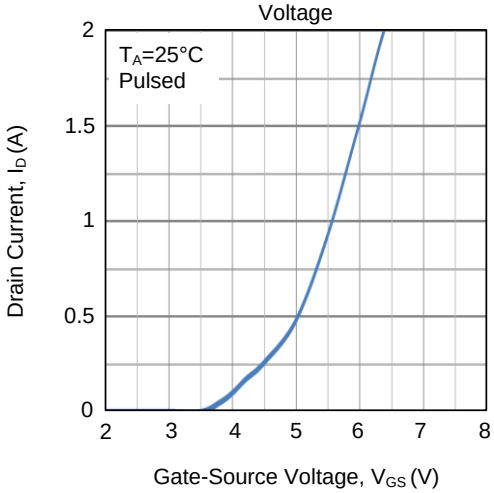
Gate Threshold Voltage vs. Junction Temperature



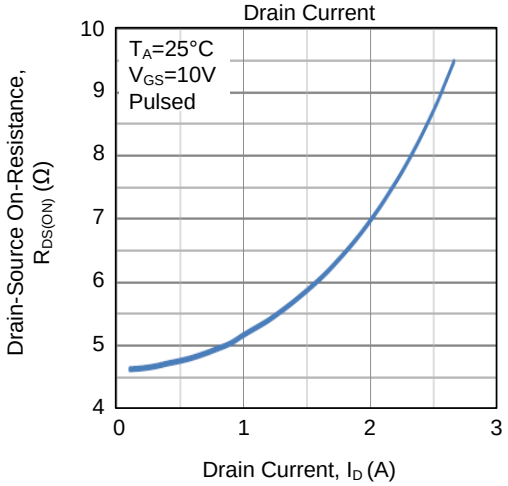
Source Current vs. Source-Drain Voltage



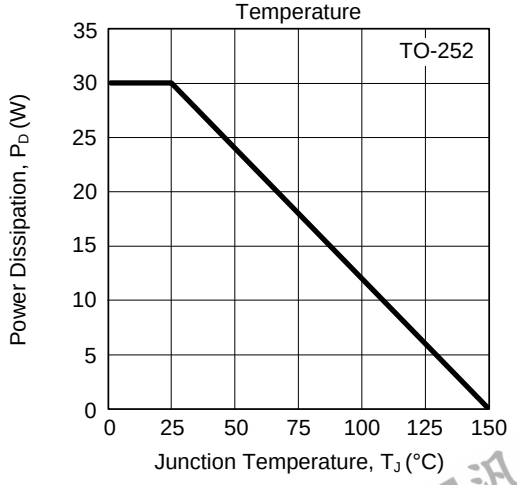
Drain Current vs. Gate-Source Voltage



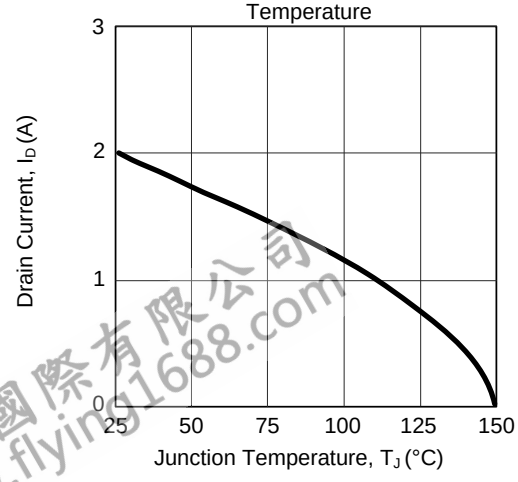
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)