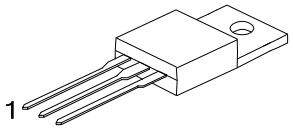
UNA03R029M

Power MOSFET

85A, 30V N-CHANNEL POWERTRENCH MOSFET



TO-220

■ DESCRIPTION

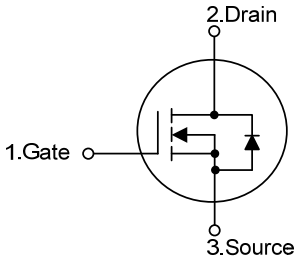
The UTC **UNA03R029M** is an N-channel MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance and low gate charge, etc.

The UTC **UNA03R029M** is suitable for DC/DC converters in computing, servers, and POL, etc.

■ FEATURES

* $R_{DS(ON)}$ < 2.9 mΩ @ V_{GS}=10V, I_D=20A
  $R_{DS(ON)}$ < 3.7 mΩ @ V_{GS}=4.5V, I_D=20A
* Very low $R_{DS(ON)}$
* Low gate charge
* High current capability

■ SYMBOL



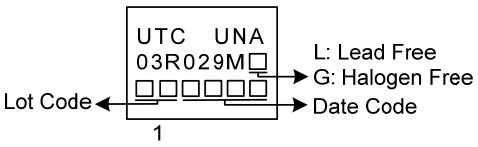
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UNA03R029ML-TA3-T	UNA03R029MG-TA3-T	TO-220	G	D	S	Tube

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

UNA03R029MG-TA3-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube (2) TA3: TO-220 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Note 6)	T_C=25°C	I_D	105	A
	T_C=100°C		82	A
Pulsed Drain Current (Note 4)		I_{DM}	400	A
Continuous Drain Current	T_A=25°C	I_{DSM}	20	A
	T_A=70°C		16	A
Avalanche Current (Note 4)		I_{AS}	68	A
Single Pulse Avalanche Energy (Note 4, 7)		E_{AS}	431	mJ
Power Dissipation (Note 3)	T_C=25°C	P_D	176	W
	T_C=100°C		88	W
Power Dissipation (Note 2)	T_A=25°C	P_D	1.9	W
	T_A=70°C		1.2	W
Junction Temperature		T_J	-55 ~ +150	°C
Storage Temperature Range		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. The value of θ_{JA} is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The Power dissipation P_{DSM} is based on θ_{JA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.
3. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
4. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.
5. The θ_{JA} is the sum of the thermal impedence from junction to case RθJC and case to ambient.
6. The maximum current rating is package limited.
7. L=0.2mH, I_{AS}=68A, V_{DD}=30V, R_G=25Ω, starting T_J=25°C.

■ THERMAL RESISTANCES CHARACTERISTICS

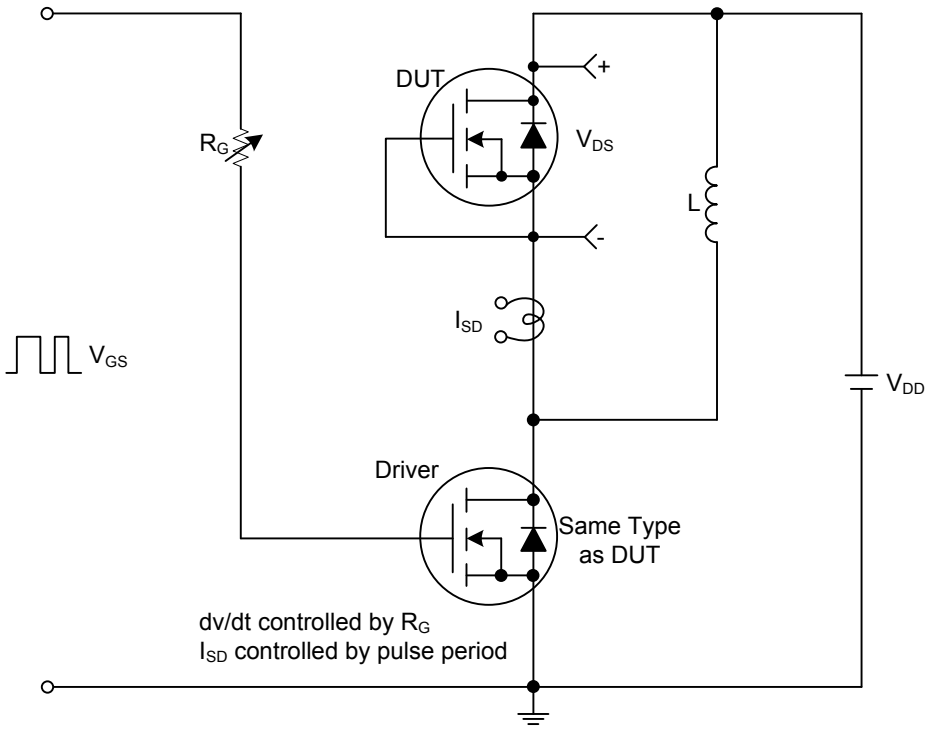
PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT
Junction to Ambient	t≤10S	θ_{JA}		12	15	°C/W
	steady state			54	65	°C/W
Junction to Case	steady state	θ_{JC}		0.7	0.85	°C/W

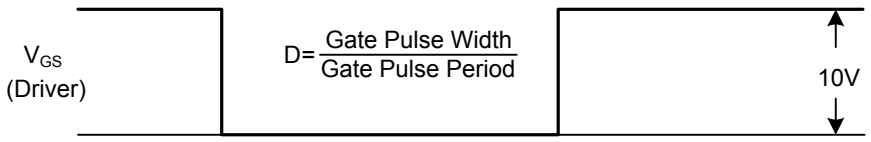
■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise noted)

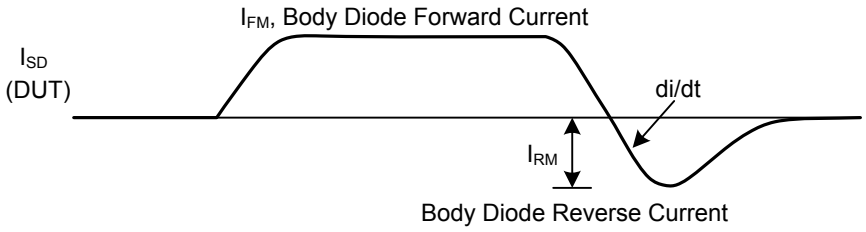
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A			2.9	mΩ
		V_{GS}=4.5V, I_D=20A			3.7	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		12600		pF
Output Capacitance	C_{OSS}			2360		pF
Reverse Transfer Capacitance	C_{RSS}			1580		pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	V_{DS}=20V, V_{GS}=10V, I_D=1.0A I_G=1mA (Note 1, 2)		400		nC
Gate to Source Charge	Q_{GS}			15		nC
Gate to Drain Charge	Q_{GD}			60		nC
Turn-ON Delay Time	$t_{D(ON)}$	V_{DS}=20V, V_{GS}=10V, I_D=1.0A, R_G=25Ω (Note 1, 2)		110		ns
Rise Time	t_R			360		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			2700		ns
Fall-Time	t_F			1500		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current (Note 3)	I_S				105	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=1A			1.00	V
Body Diode Reverse Recovery Time	t_{rr}	I_F=20A, dI/dt=100A/μs		225		ns
Body Diode Reverse Recovery Charge	Q_{rr}			880		nC

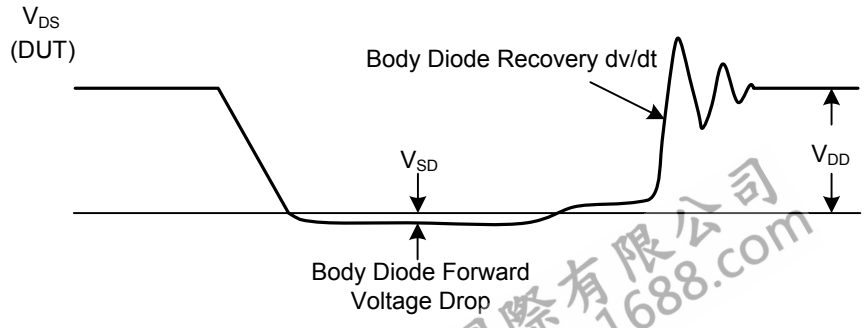
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.
3. The maximum current rating is package limited.

■ TEST CIRCUITS AND WAVEFORMS



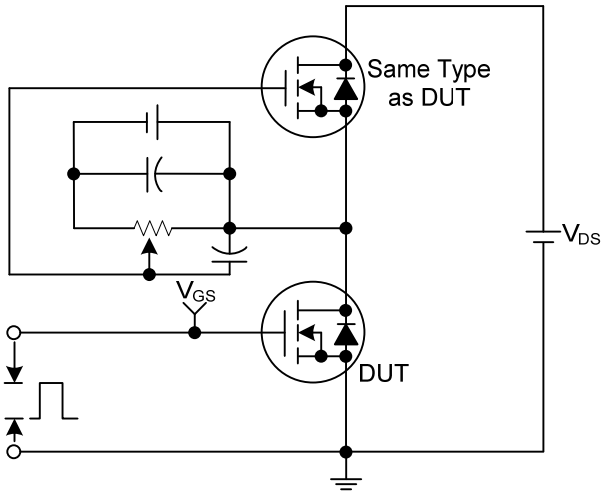




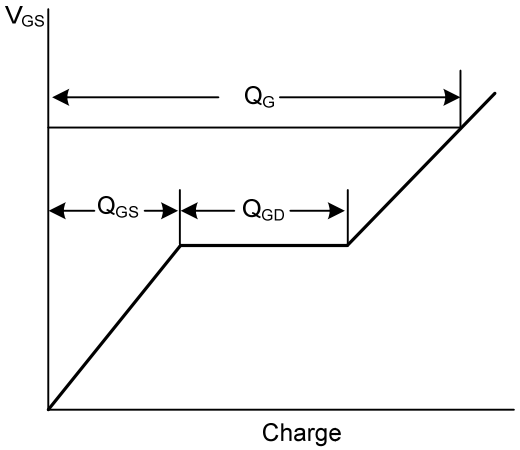


Peak Diode Recovery dv/dt Test Circuit and Waveforms

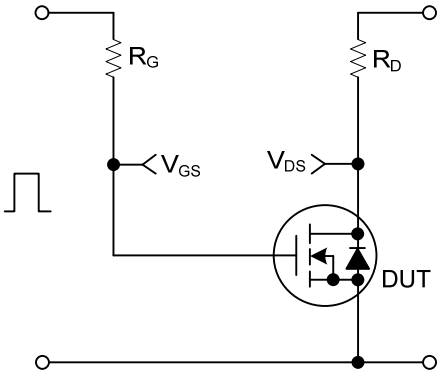
■ TEST CIRCUITS AND WAVEFORMS



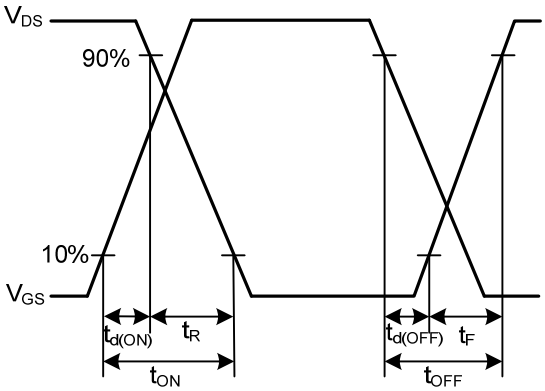
Gate Charge Test Circuit



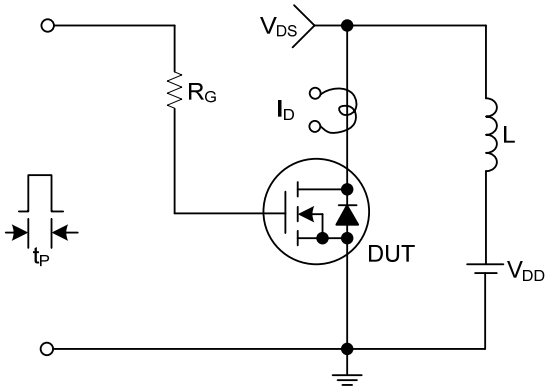
Gate Charge Waveforms



Resistive Switching Test Circuit

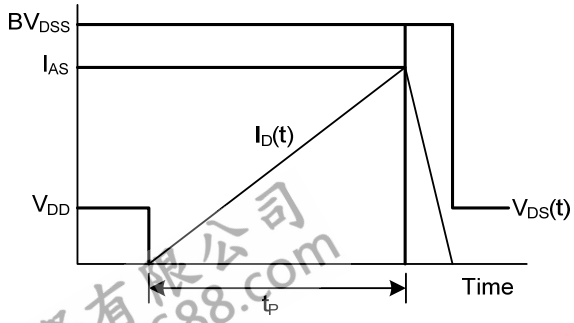


Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

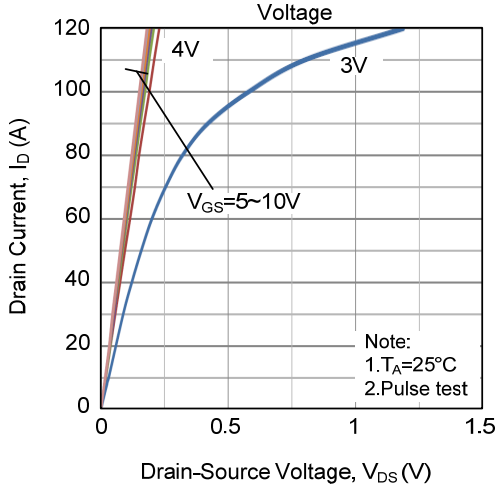
$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



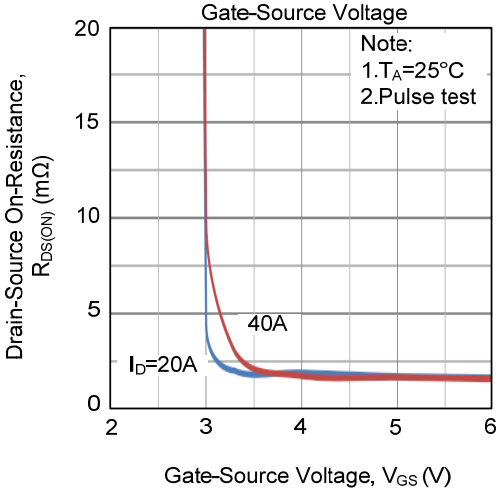
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

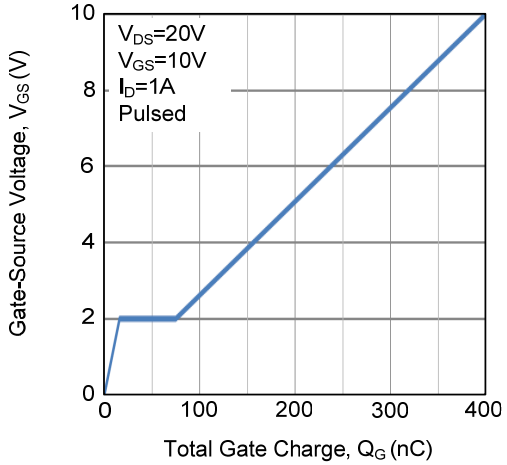
Drain Current vs. Drain-Source Voltage



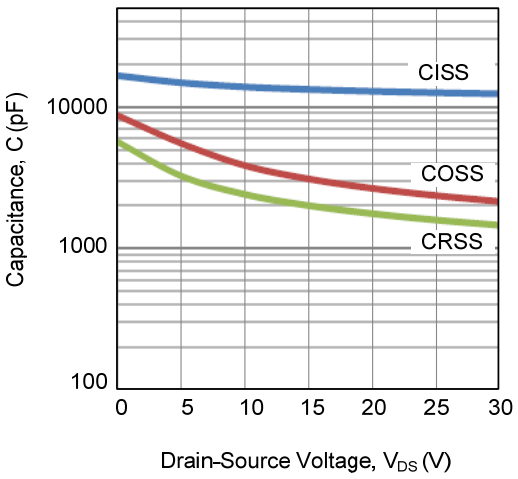
Drain-Source On-Resistance vs. Gate-Source Voltage



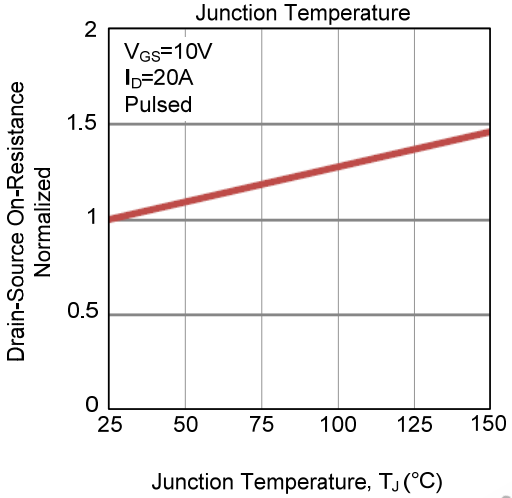
Gate Charge Characteristics



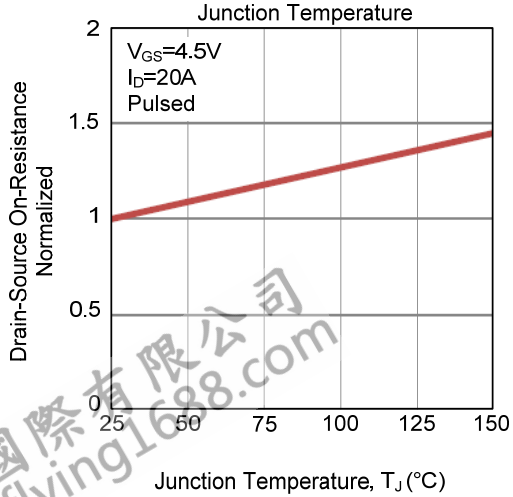
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

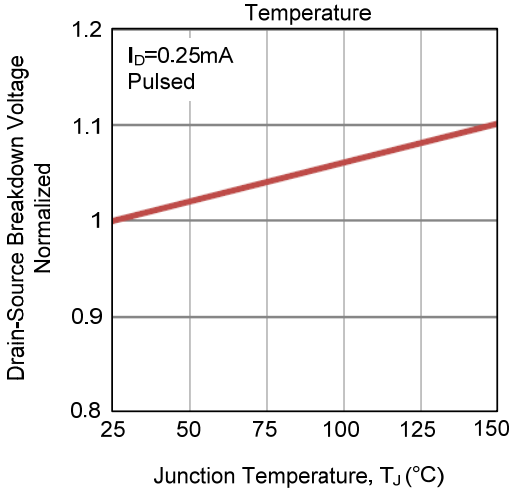


Drain-Source On-Resistance vs. Junction Temperature

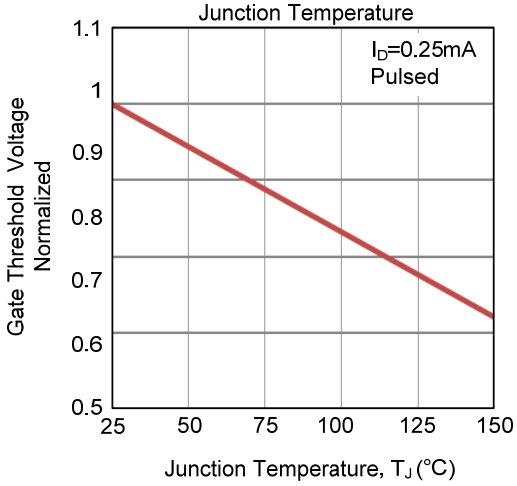


■ TYPICAL CHARACTERISTICS (Cont.)

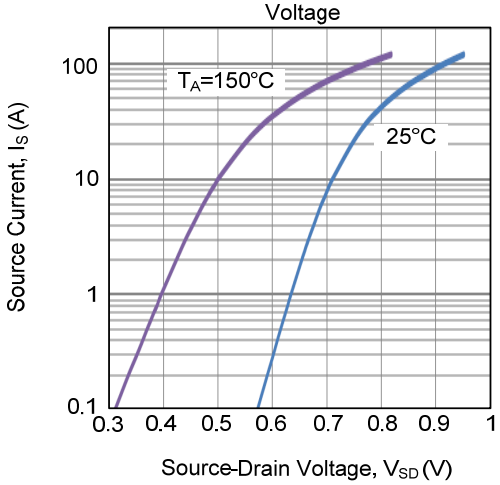
Breakdown Voltage vs. Junction Temperature



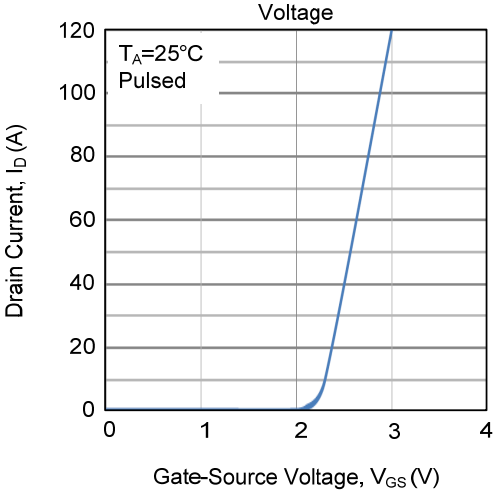
Gate Threshold Voltage vs. Junction Temperature



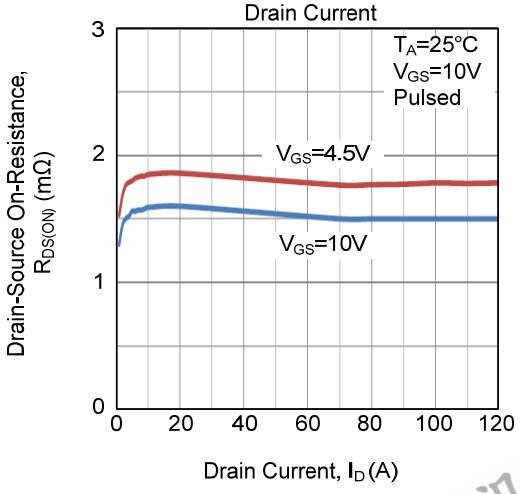
Source Current vs. Source-Drain Voltage



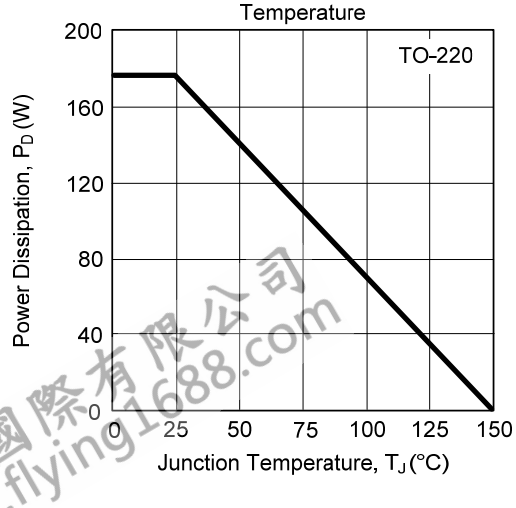
Drain Current vs. Gate-Source Voltage



Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)