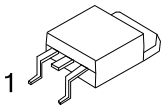
UP2003

Power MOSFET

9A, 25V P-CHANNEL LOGIC LEVEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR



TO-252

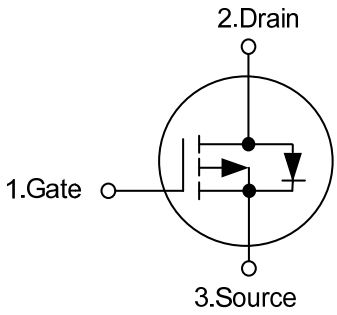
■ DESCRIPTION

The **UP2003** uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

■ FEATURES

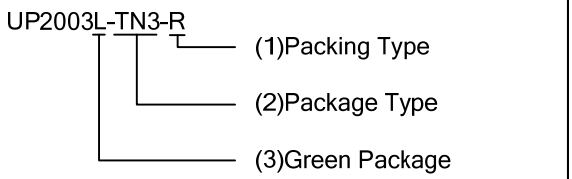
* $R_{DS(ON)}$<35 mΩ @ V_{GS} =-4.5 V, I_D =-7 A
* $R_{DS(ON)}$<20 mΩ @ V_{GS} =-10 V, I_D =-9 A

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UP2003L-TN3-R	UP2003G-TN3-R	TO-252	G	D	S	Tape Reel

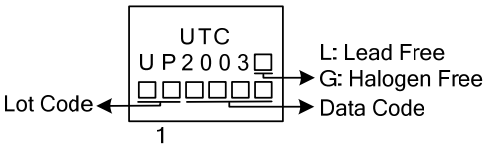


(1) R: Tape Reel

(2) TN3: TO-252

(3) L: Lead Free, G: Halogen Free and Lead Free

■ MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Drain Source Voltage	V_{DSS}	-25	V
Gate Source voltage	V_{GSS}	±20	V
Continuous Drain Current	I_D	-9	A
Pulsed Drain Current (Note 1)	I_{DM}	-36	
Power Dissipation	P_D	2.5	W
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-55 ~ +150	

Note: 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.

■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Junction-to-Ambient	θ_{JA}			50	°C/W
Junction-to-Case	θ_{JC}			25	°C/W

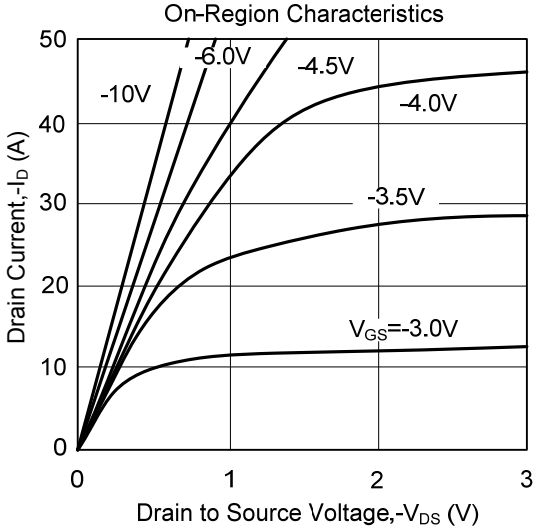
■ ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D=-250μA	-25			V
Drain Source Leakage Current	I_{DSS}	V_{DS} =-25V, V_{GS} =0V			-1	μA
Gate-Body 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	-1.5	-3.0	V
On-State Drain Current (Note 2)	$I_{D(ON)}$	V_{DS} = -5V, V_{GS} = -10V	-50			A
Drain-Source On-Resistance (Note 2)	$R_{DS(ON)}$	V_{GS} =-4.5V, I_D =-7A		25	35	mΩ
		V_{GS} =-10V, I_D =-9A		15	20	
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS} =-15V, V_{GS} =0V, f=1MHz		1610		pF
Output Capacitance	C_{OSS}			410		
Reverse Transfer Capacitance	C_{RSS}			200		
SWITCHING PARAMETERS (Note 3)						
Gate to Source Charge	Q_G	V_{DS} =-12.5$V_{(BR)DSS}$, V_{GS} =-10V, I_D =-9 A		17	24	nC
Gate Charge at Threshold	Q_{GS}			5		
Gate to Drain Charge	Q_{GD}			6		
Turn-ON Delay Time	$t_{D(ON)}$	V_{DS} =-12.5V, I_D≈-1A, V_{GS} =-10V, R_{GS} =6Ω ,R_L=1Ω		6.2	9.3	ns
Turn-ON Rise Time	t_R			10		
Turn-OFF Delay Time	$t_{D(OFF)}$			18		
Turn-ON Delay Time	$t_{D(ON)}$			10		
Turn-OFF Fall-Time	t_F			5		
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Diode Continuous Forward Current	I_S				-9	A
Diode Pulse Current (Note 1)	I_{SM}				-36	
Forward Voltage (Note 2)	V_{SD}	I_F=I_S, V_{GS}=0V			-1.2	V

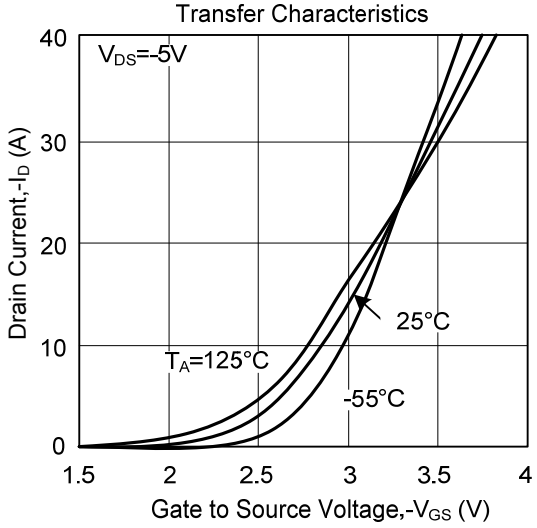
Note: 1. Pulse width limited by maximum junction temperature.
2. Pulse test: Pulse Width ≤ 300μsec, Duty Cycle ≤ 2%
3. Independent of operating temperature.

■ TYPICAL CHARACTERISTICS

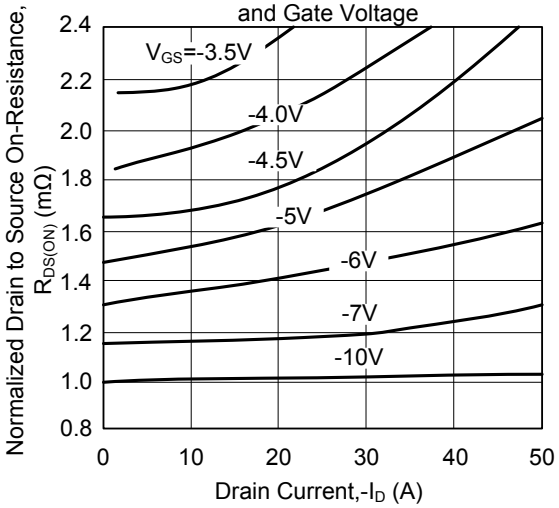
On-Region Characteristics



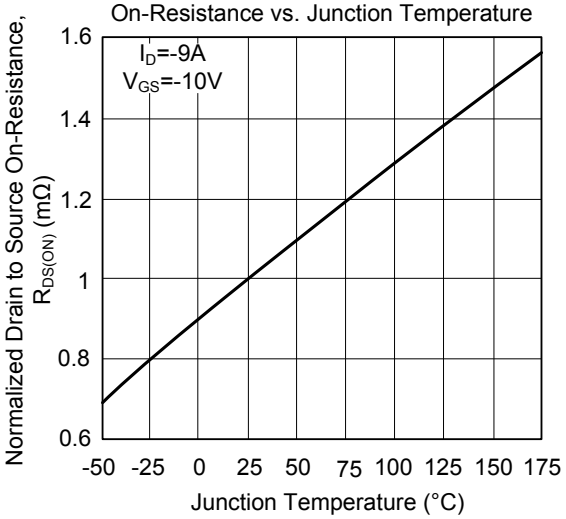
Transfer Characteristics



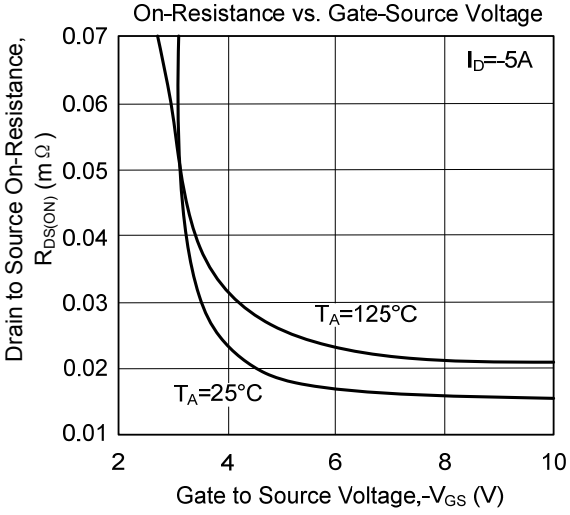
On-Resistance vs. Drain Current and Gate Voltage



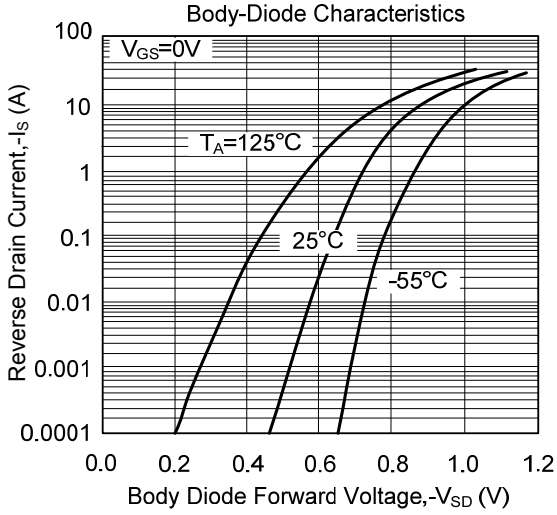
On-Resistance vs. Junction Temperature



On-Resistance vs. Gate-Source Voltage

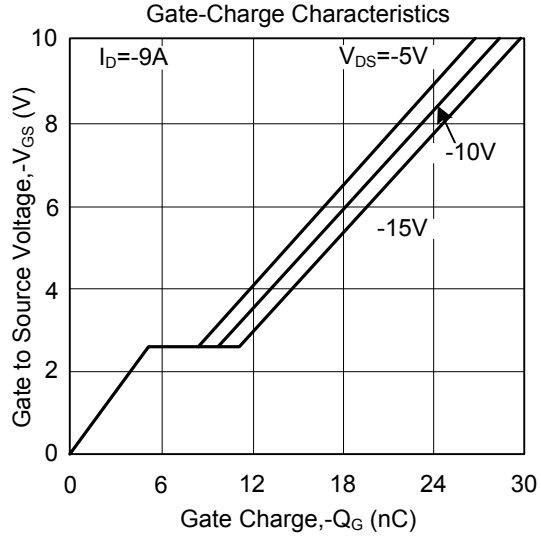


Body-Diode Characteristics

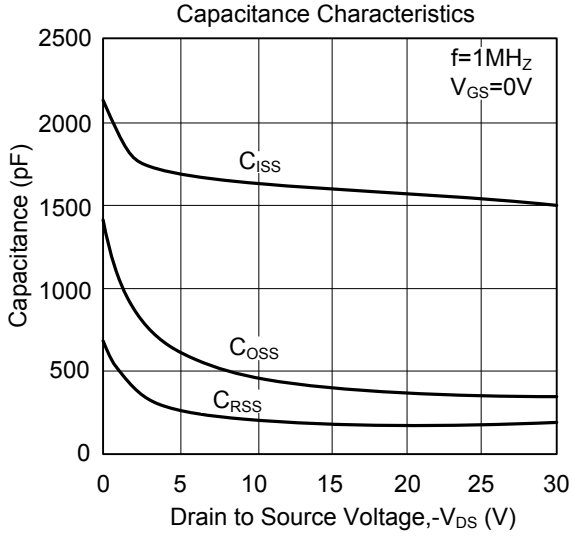


■ TYPICAL CHARACTERISTICS(Cont.)

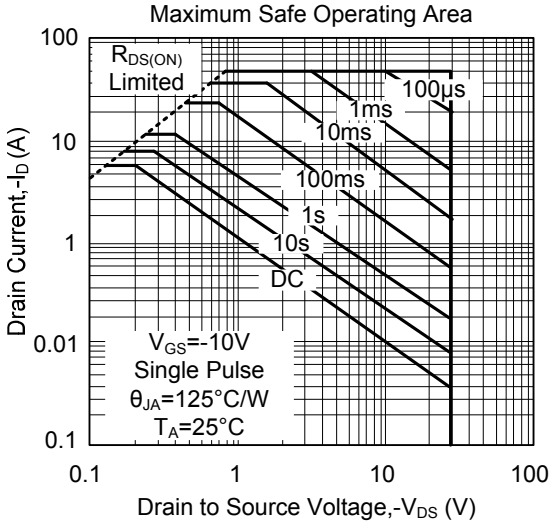
Gate-Charge Characteristics



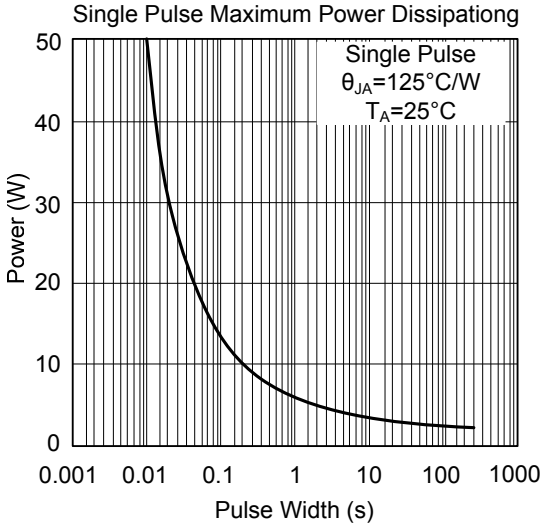
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipationg



Transient Thermal Response Curve